HAROLD B. LEE LIBRARY
BRIGHAM YOUNG UNIVERSITY
PROVO, UTAH

BX
8643.1
.Er44p
1922
no. 2

The University of Chicago

THE PSYCHOLOGICAL AND ETHICAL ASPECTS OF MORMON GROUP LIFE

A DISSERTATION

SUBMITTED TO THE FACULTY
OF THE GRADUATE SCHOOL OF ARTS AND LITERATURE
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

DEPARTMENT OF PHILOSOPHY

BY

EPHRAIM EDWARD ERICKSEN

THE UNIVERSITY OF CHICAGO PRESS
CHICAGO, ILLINOIS

Copyright 1922 By
The University of Chicago

All Rights Reserved

Published September 1922

THE LIBRARY
BRIGHAM YOUNG UNIVERSITY
PROVO, UTAH

Composed and Printed By
The University of Chicago Press
Chicago, Illinois, U.S.A.

COPYRIGHT 1922 BY
THE UNIVERSITY OF CHICAGO

All Rights Reserved

Published September 1922

TO MY
FATHER AND MOTHER

PREFACE

It is the purpose of this work to interpret the life-history of the Mormon group in the scientific spirit, and, in so far as the present methods of social and psychological investigation are adequate, to get at fundamental psychological and ethical principles. I realize, however, that the Mormon group life is extremely complex, as is every social unit, and cannot be stated in simple terms. I realize also my own limitations in dealing with the problem. One who has been associated all his life with the Mormon people, as I have been, is sure to have formed prejudices and conceptions which render an objective and impartial study of them extremely difficult. But on the other hand, the inner life of the group, its sentiments, and ideals, can be comprehended only by one who has actually experienced them. I therefore regard myself as justified in attempting to describe and interpret the sentiments which I have to a certain extent experienced in common with the group.

In this work I do not pretend to give a detailed account of Mormon history. The accounts of historical events have been purposely reduced to very brief statements in order to give greater prominence to the psychological aspects of the different situations in which the Mormon group was placed. It is the group sentiments with which we are here concerned, and particularly the genetic development of Mormon group consciousness.

In so far as I have succeeded in making this work scientific it has been through the influence of the instructors in the departments of philosophy and political economy in the University of Chicago. I am especially indebted to Professors James H. Tufts, George H. Mead, and Edward S. Ames, for the ethical and psychological point of view. For methods of investigation and organization of material I must acknowledge the help which I have received from the late Professor Robert Hoxie and from Professor James Laurence Laughlin, of the Department of Political Economy.

In the collecting of the material as well as its interpretation I am deeply indebted to my wife, who collected much valuable source material which I otherwise would not have received.

EPHRAIM EDWARD ERICKSEN

CONTENTS

CHAPTER PAGE

I. INTRODUCTION 3

The Psychological Point of View. Description of Mormon Ideals and Institutions. Mormonism as an Accumulation of Sentiments.

PART I. MALADJUSTMENT BETWEEN MORMONS AND GENTILES

II. THE ORIGIN OF MORMONISM AND THE BEGINNING OF CONFLICT 13

The Relation of the Prophet to the Group. The Imitation of Ancient Israel. The Conflict between Mormonism and Christian Traditions. The Origin of Mormon Economic Ideals.

III. ZION IN MISSOURI—GROUP CONSCIOUSNESS AS THE CAUSE OF CONFLICT 18

The Establishment of Zion. Causes of the Conflict in Missouri. How Group Sentiment Developed. Mob Spirit as the Outcome of Group Consciousness.

IV. ZION IN ILLINOIS—AN INDEPENDENT CITY 25

Group Sentiment Affects Only the Conflicting Groups. Significance of Group Solidarity. Joseph Smith Expresses the Spirit of the Group. Lasting Effect of the Group Conflicts.

PART II. MALADJUSTMENT BETWEEN MORMONS AND NATURE

V. THE MORMON MIGRATION—FROM A CONFLICT WITH MEN TO A STRUGGLE WITH NATURE 35

A New Type of Leadership. The New Problems. The Organization for the New Life.

VI. MORMON COLONIZATION 40

The Colonization Problem. The Irrigation Problem. The Establishment of Colonies. The Population Problem. The Success of Mormon Enterprises.

VII. INDUSTRIAL AND COMMERCIAL CO-OPERATION —THE UNITED ORDER 49

The Demand for Co-operative Methods. The Manufacturing Problem. Zion's Co-operative Movement. The Decline of the Co-operative Enterprise.

PART III. MALADJUSTMENT BETWEEN NEW THOUGHT AND OLD INSTITUTIONS

CHAPTER PAGE

VIII. The Innovation of Science and Democracy 59
The Conditions of Internal Conflict. The Growing Spirit of Individualism. The Influence of Mormon Priesthood. Conflict between Dogmas and the Scientific Spirit.

IX. The Church and Business 66
Traditional Character of the Mormon Economic Life. The Changing Attitude toward the Tithing System. The Centralized Control of Church Revenues. The Pecuniary Point of View of Church Leaders.

X. Conflicts in the Mormon Marriage Institutions 73
Origin and History of Mormon Polygamy. The Relation of Polygamy to the Social Ideal. The Conflicting Attitudes toward Polygamy.

XI. The Ethics of Mormonism 80
The Significance of the Life-History of a Group. The Ethical Study. The Period of Mormon Group Ethics. The Utilitarian Stage of Mormon Ethics. The Formal Stage.

XII. The Possibilities for Adjustment 96
The Two General Points of View. The Negative Character of Criticism. The Reconstructive Factors in Mormonism. A Demand for a New Problem.

Index 103

INTRODUCTION

CHAPTER I

INTRODUCTION

According to functional psychology, development in the life of the individual is marked by a series of crises. Meaning grows out of conscious behavior, but behavior becomes conscious only when a maladjustment exists between the individual and his environment. Consciousness becomes most alert and active when there is a need for adjustment. Under ordinary conditions instincts and habits direct the conduct of the individual but when a new situation presents itself these forms of control are inadequate and must be directed by consciousness. Instincts and habits tend to maintain that level of behavior already established, but it is the factor of consciousness which accounts for present standards of conduct; it is this extraordinary form of control which inhibits instincts, breaks up old habits, and initiates new modes of behavior. These crises may thus be regarded as the essential causes of the individual's mental attitude, his sentiments, and concepts, as well as the characteristic organization of his thinking.

This principle holds in social evolution as well as in individual adaptation. A problem presenting itself requires that the individual or the community change the old habits, customs, and thought and establish new modes of behavior suitable to the new situation. Any event, institution, or idea which facilitates or hinders this adjustment receives attention and is given significance. Thus historians are beginning to realize that the unity of history is best attained if the great problems which the people encounter are made the basis of discussion and if the historical events and characters are given importance according to the part they have played in the larger social adjustments.

This thesis is an attempt to apply the principles of functional psychology to Mormon history. The latter is here conceived as a process of mental and social adaptation. The discussion divides itself into three parts on the basis of three great maladjustments. The material selected for discussion and the points emphasized have all been determined by their relationship to these larger problems. The first part is a discussion of the conflict between the Mormons and Gentiles and is an analysis of the psychological and sociological factors involved. The second part deals with the maladjustment between the Mormon people and nature in the desert region of the Great Basin. An effort is here made to define the problem and to present the Mormons' method of co-operation employed in its solution. We shall also observe here the reopening of the conflict between the Mormons and the Gentiles, caused in part by the economic competition between local institutions and eastern factories and business houses, which resulted from the extension of the Union Pacific Railroad into the Territory, and in part by the practice of polygamy which caused friction with the United States government. The third part is a discussion of the present maladjustment, a conflict between the Mormon institutions and traditions on the one hand and the innovations of science and the new democratic spirit on the other.

In the present chapter it is intended to give a general description of the social ideal of Mormonism, its organization, and system of revenue. But, since the purpose of this thesis is to deal with ideals and institutions as they developed in the community, only those most characteristic need be described here. There are, however, elements which seem to have functioned either positively or negatively throughout the entire life of Mormonism. To state the factors in an introductory way may help the reader to see at the outset the nature of the problems.

Mormonism embraces the economic and the political as well as the religious life of its adherents. Its ideals are temporal as well as spiritual. The material welfare of the community has occupied the attention of the ecclesiastical leaders quite as much as have the purely religious matters. Every president of the church from Joseph Smith, the founder of the religion, to Joseph F. Smith, the recent leader, has established colonies, built factories, and promoted mercantile institutions,[1] The ideal social order is the "Kingdom of God" or "Zion," a concept which, to the Mormons, means a community of prosperous people as well as a community of righteous people. To build temples in which the "pure in heart" might worship is a sacred task but no more so than to establish industries in which the "chosen people" might be employed. The church is in reality a theocracy. God is its supreme temporal and spiritual ruler. Through his priesthood he directs the affairs of the commonwealth and of the religious body. In this ideal order only one set of statutes or laws exists and they are God's commands which serve the purpose of both "Church and Kingdom."[2]

[1] "It has always been a cardinal teaching with the Latter-Day Saints," says the late President Joseph F. Smith, "that a religion which has not the power to save people temporarily and make them prosperous and happy here cannot be depended upon to save them spiritually, to exalt them in the life to come"—*Out West*, XXIII, 242.

[2] Keeler, *Lesser Priesthood*, p. 57.

But, according to original Mormon doctrine, the "Kingdom of God" cannot be built up under the present economic conditions. The individual accumulation of wealth must be abolished before the ideal spiritual relationship can exist. The highest spiritual and moral life cannot develop under a system of individual ownership. All wealth belongs to the Lord and it is to be used in the furtherance of his cause. Property and human effort have but one purpose, the establishment of Zion. The ideal economic relationship, emphasized more in early Mormon history than now, is called by them the "United Order." In the language of the late President Joseph F. Smith:

> The "United Order" is a religo-social system communal in its character, designed to abolish poverty, monopoly, and kindred evils, and to bring about unity and equality in temporal and spiritual things. It requires the consecration to the church, by its members of all their properties, and the subsequent distribution to those members, by the church, of what were termed, stewardship. Each holder of a stewardship which might be some farm, workshop, store, or factory that this same person had consecrated—was expected to manage it thereafter in the interest of the whole community, all his gains revert to a common fund, from which he would derive a sufficient support for himself and those dependent upon him. The bishop being the temporal officer of the church, received the consecrations of these properties, and also assigned the stewardships; but he performed his duty under the direction of the First Presidency. . . . .[1]

This order is regarded as a system patterned after that which the apostles of Christ set up in Jerusalem in which they had all things in common.[2] The Mormons also believe that it was this divine order which "sanctified the City of Enoch."

The term priesthood in the Mormon church stands for authority as well as signifying a special calling. There are only two priesthoods in the church but there are many degrees of authority. Each of the two orders or grand divisions is subdivided into groups of offices embodying different degrees of authority and demanding different kinds of responsibility. An individual, for example, is ordained to the Melchisedek Priesthood in the office of an Elder, Seventy, or High-Priest. Or he may be ordained to the Aaronic Priesthood in the office of Deacon, Teacher, or Priest. In general, offices in the Melchisedek order are higher and of a more spiritual character while those of the Aaronic priesthood are of a temporal nature and carry a lesser degree of authority. Such a distinction, however, holds only in a general way. Both priesthoods have, to a certain extent, both spiritual and temporal functions. All matters of church interest are directed by officers in the Melchisedek priesthood. The president of the church who holds the higher order of authority has, in theory at least, unlimited power in all matters of church interest, both spiritual and temporal. The presiding bishop, who is also of the higher order, directs in all those matters which pertain to the collection of tithing and church revenues.[1] The local bishop, unless he, through revelation, is declared to be a direct descendant of Aaron, holds the Melchisedek priesthood. His special calling is to preside over a local church community and to direct in both temporal and spiritual affairs.

---

[1] *Out West*, XXIII, 244. [2] Acts 4:34-35.

The revenue system of the church adds greatly to its strength and to the effectiveness of its efforts. There are three main sources of revenue, the tithing, income from property holdings, and free-will offerings. The first two represent permanent and increasing incomes, the third comes in the form of donations presented at times and in amounts determined by the need of the occasion and the ability and disposition of the giver. The tithing is like an income tax except that instead of having a variable rate dependent on the income, the tithing calls for 10 per cent regardless of what the individuals' earnings may be. The collection of tithing is, however, free from all coercion except such as the social and psychological consequences may impose. The following is the "commandment"[2] regarding tithing. It is typical of all the revelations which Joseph Smith presented to his people.

> Verily thus sayeth the Lord, I require all their surplus property to be put into the hands of the bishop of my church of Zion. For the building of mine house and for the laying of the foundation of Zion and for the priesthood, and for the debts of the presidency of my church:
>
> And this shall be the beginning of the tithing of my people; and after that those who have thus been tithed shall pay one tenth of all their interests annually; and this shall be a standing law unto them for ever, for my holy priesthood sayeth the Lord.[3]

The law of tithing was instituted in Missouri immediately after the discontinuance of the law of consecration or United Order.[4] It was not intended, however, to do away with the latter law. The United Order, although it is not often referred to by the present authorities of the church, is still regarded by many as the ideal economic system.

---

[1] Keeler, *op. cit.*, p. 116.

[2] The revelations of Joseph Smith are compiled in a book called *Doctrine and Covenants*. To the Mormon people its content is of great importance, ranking equal with that of the Bible.

[3] *Doctrine and Covenants*, Section 119:1–4.

[4] Joseph F. Smith, *Eighty-fifth Conference Report*, pp. 139–40.

The source of revenue next in importance to tithing is that derived from church property holdings. The church holds stock in some of the leading corporations of the state. Among these are sugar factories, salt manufactures, and mercantile institutions. It was the policy of the church, when there was insufficient private capital in the state, to invest in enterprises which it regarded as needful in the community. From these investments the church draws a revenue quite sufficient to pay the salaries of all church officials who are compensated by the church.

The free-will offering is much less in amount than either of the above-named sources. The bulk of these offerings is received on "Fast-day," the first Sunday in each month, which is a day of general fasting. The equivalent value of the food thus saved is turned over to the local bishop for the support of the poor. These contributions are immediately distributed to the poor for the purchase of food, clothing, etc. Another source of revenue is known as the "Relief Society" donations. Every woman in the church is expected to make regular contributions to this fund which also goes to the support of the poor in the church.

This brief analysis of the ideals and institutions which are most characteristic of Mormon life prepares the way for a more detailed study of the larger problems. These factors, combined with human prejudices and persecutions on the one hand and the forces of the physical environment on the other hand, have determined Mormon history as well as the present spirit and life of the group. The relationship of these factors and their relative importance will be made obvious when we consider them in connection with the great maladjustments of Mormon history.

But this attempt to define Mormonism in terms of its aims and institutions should serve only to give a general notion of the system. It is by no means intended to be a full description. The ideals and institutions have themselves only relative or functional meaning. Processes of elimination, modification, and accumulation are constantly taking place. Like every other social system Mormonism has been forced to adjust itself to varying circumstances. This has been true notwithstanding the tendency within the church to regard the system as universal and eternal and entirely beyond human control. And notwithstanding the appropriation of many of the ideals and institutions of ancient Israel the group has absorbed sentiments and ideas from its social environment.

This thesis endeavors to account for the structure and aims of Mormonism through a study of its life-history. The writer maintains that ideals were developed and institutions were formulated in the course of this history and that many of these ideals and the essential forms of social control as well were given birth through a strongly felt need for them. These institutions in turn reacted upon the life of the community, and thus the effect became also a cause. So important did these secondary causes become that many people have identified Mormonism with them. They have been regarded as its very essence. For example, to some people Mormonism means polygamy, to others it means communism, and others identify it with revelation, belief in divine authority, or conceptions of baptism for the living and the dead. Mormonism is not to be identified with any one of these doctrines or with the entire sum of them. Its essential characteristics are not found in its theology. A large part of its theology is copied from the Old and the New Testament. To find the true meaning of Mormonism we must go to its group sentiments. If we are to comprehend its life we must analyze its spiritual life, we must study the problems which have confronted the people and the sentiments derived from the struggle with them. We must observe Mormonism in the periods of its greatest activity.

The great conflicts and struggles of the Mormon people, those events in the life of the group which have received the focus of attention and which were felt as vital experiences by the entire group, are here considered to be the essential causes of their sentiments and ideals as well as conditions out of which many of their institutions developed. We are thus concerned with analyzing problems, rather than following the sequence of historical events. We are more concerned with the attitudes, sentiments, and ideas in relation to events than we are with the events themselves. That which transpires externally is here considered less significant than the reaction which follows in the conscious life of the community. It is the ideals and sentiments resulting from experience rather than the experiences themselves which reveals the true life of a people. Special attention will therefore be given to direct statements and expressions of sentiment.

But sentiments are not to be regarded as independent of the active life of a community. They develop out of the social intercourse which takes place in connection with the larger economic, social, and religious problems of the community. The greater the problems are the stronger will the sentiments become. But these economic and social problems are to be regarded also as the effect of the psychological life. In other words an external situation becomes a problem only when it is conceived as such. The relation between the subjective and the objective life is reciprocal. The Mormon people were confronted by great problems in their relations with the people of Missouri and Illinois and in their

M. WILFORD POULSON

struggle for life in the Rocky Mountain country and these problems created strong sentiments among the individuals who were co-operatively engaged in the struggle. On the other hand, these group sentiments thus created reacted upon the objective life.

To explain the Mormon community life in terms of its whole life-process, its conflicts, its struggles, its crises, is the problem of this thesis. Although there were notions advocated by Joseph Smith which were antecedent to the conflict and which really occasioned it yet these were not important in themselves. Had it not been for the conflict which forced them upon the attention, they would perhaps not have survived. It is group conflict and struggles which have created and maintained the basic Mormon sentiments.

PART I. MALADJUSTMENT BETWEEN MORMONS AND GENTILES

CHAPTER II

THE ORIGIN OF MORMONISM AND THE BEGINNING OF CONFLICT

Since the social point of view is the one proposed in this study the method to be followed is pragmatic rather than analytic. The special emphasis will be upon the consequences of the Mormon institutions and methods rather than upon the origin. Institutions are made and ideals are formed in the process of adjustment. Neither the individual consciousness nor the social life will indulge in absolute luxuries. If an idea or an attitude or an institution is to long remain it must serve some purpose, at least it must function in adjustment. The very fact that a social system continues and grows gives evidence that it meets some human need although it may be the mere satisfaction of a very primitive and artificial desire. The aim here is, therefore, not to pass judgment upon the absolute rightness or wrongness of the Mormon system but rather to recognize its problems and to evaluate its elements by considering the part they play in the solution of these problems. "In the end," says James, "Christian mysticism had to come to our empiricist criterion: 'By their fruits ye shall know them'; not by their roots. . . . . The roots of man's virtue are inaccessible to us."[1] Furthermore, the validity of a religion should not be judged by the neurotic constitution of its author. He says: "In the natural sciences and industrial arts it never occurs to any one to try to refute opinion by showing up their author's neurotic constitution. . . . . It should not be otherwise with religious opinions. Their value can only be ascertained by the spiritual judgments directly passed upon them."[2]

Joseph Smith met with extraordinary success in establishing his ideals in the minds of his followers. In less than a year he succeeded in bringing hundreds to his way of thinking. Before his death thousands had joined the church. What is the explanation? To the orthodox Mormon it is simple. It was the voice of God speaking through his prophet. Christ had called them and they knew the voice of their shepherd. It was the spirit of God or the "still small voice" which brought conviction to their souls. To the opposing religious dogmatist the answer is likewise simple. To him Joseph Smith was an agent of

---

[1] James, *Varieties of Religious Experience*, pp. 17–18.

[2] *Loc. cit.*

Lucifer. The followers of Joseph Smith were deceived. Satan had tempted them and they fell into darkness. Neither answer satisfies the true scientist who knows man only, on the one hand, through his social and physical environment and, on the other hand, through the response he makes to this environment.

Mormonism had its beginning in an environment, physically and socially, of a most primitive character. Western New York, the place of its inception, was in 1830, little more than a wilderness. The boy prophet was limited very seriously in educational opportunities. For him and his associates the Bible was practically the only literature. Schools were conducted for only a few weeks during the winter. The church was the one means of social intercourse. But this sort of social intercourse was found in abundance. It was rich with spiritual suggestions and dominated the entire social consciousness. Religious revivals were frequently held and the minds of the people were very susceptible to mystical phenomena. The stories of the Bible seemed very real to them and they naturally embodied their ideals in Abraham, Jacob, Moses, and other Old Testament prophets who talked with God face to face.

But in addition to the mystical and highly spiritual environment which was undoubtedly favorable to the acceptance of the new revelations, there were, in the personality of Joseph Smith, elements characteristic of a religious genius. He was emotional, impulsive and spiritual-minded. He was uneducated, yet he possessed considerable native ability. Few men seem to have such keen insight into human nature. This ability is manifest in his dealings with his followers. He never imposed his views upon them directly. He assumed the position of a prophet and spoke in the name of the Lord. In a most tactful way he held himself separate from the things revealed. Yet he was by no means lost to the consciousness of his people. On the contrary he was the prophet through whom God revealed himself; he was the means whereby the Lord was to bring about a wonderful work. Every commandment must be revealed through him before it could become law to the community or the individual members.

Another method which he employed was to present the revelations as nearly as he could in Bible language. This gave to them a divine ring. It made his followers feel that they were living a life such as that of ancient Israel, that a prophet was in reality presenting to them God's message. To a people who idealized the past as did the Bible readers of the frontier in the first half of the nineteenth century, such language was truly divine. The language of the Bible was the language of God. This ability to imitate the sacred literature was thus a source of strength to the modern prophet.

But Joseph Smith not only imitated the language of the Bible but he appropriated all the institutions and ideals of ancient Israel. And here we find the cause of the beginning of the great Mormon and non-Mormon conflict. The ideals and institutions of that ancient people were out of harmony with Christian tenets. The latter had made the other world the ideal home and resting place for the faithful. Mormonism, in its attempt to introduce Israelitish ideals, was setting up a material kingdom, a Zion on earth. To the Christian world, it was materialism against mysticism, carnality against spirituality. In the Tenth Article of Faith, Joseph Smith, in speaking for the people, says: "We believe in the literal gathering of Israel and in the restoration of the Ten Tribes. That Zion will be built upon this (American) continent. . . . ." This Zion was more than a mere mental state or spiritual order such as the Christian world held up as its ideal. It was a real country which was given to the Saints of God, an eternal home for scattered Israel, a land which was sanctified and blessed for the select children of God. It was a city which the Mormons were to build and which was to stand over against all non-Mormon communities. Here is the revelation:

> And I hold forth and deign to give unto you greater riches, even a land of promise, a land flowing with milk and honey, upon which there shall be no curse when the Lord cometh:
>
> And I will give it unto you for the land of your inheritance, if you seek it with all your hearts:
>
> And this shall be my covenant with you, ye shall have it for the land of your inheritance, and for the inheritance of your children forever, while the earth shall stand, and ye shall possess it again in eternity, no more to pass away.[1]

Thus the Mormons were called out of Babylon, the country of the Gentiles, to inhabit a promised land just as Israel was called out of Egypt. They were the people which God recognized and to whom he would grant special favors. Note the resemblance between the foregoing revelation to the Mormons and the following to Abraham and ancient Israel:

> And the Lord said unto Abram, ... Lift up thine eyes, and look from the place where thou art, northward, and southward, and eastward, and westward:
>
> For all the land which thou seest, to thee will I give it and to thy seed forever.

---

[1] *Doctrine and Covenants*, Section 38:18–20.

> And I will make thy seed as the dust of the earth: so that if a man can number the dust of the earth, then shall thy seed also be numbered.[1]

This promise was repeated to Israel.

> And I have also established by covenant with them, to give them the land of Canaan. . . . .
>
> And I will bring you in unto the land, concerning which I did swear to give it to Abraham, to Isaac, and to Jacob; and I will give it you for an heritage.[2]

In contrast with the material kingdom of ancient Israel and early Mormonism, with their land "flowing with milk and honey," their flocks and herds, and numerous posterity, is the Christian blessedness of the spiritual life and the other world, "the kingdom of God within you"[3] or the kingdom "not of this world," or the "holy city, new Jerusalem" which was already prepared and should come down from God out of heaven.[4] The kingdom of God according to Christianity transcends life. It is in a sphere beyond the carnal nature of man. This is true whether it is conceived as a gift from God or an attainment through righteous living; whether it is regarded as an ideal social order or as a quality or power within the individual. The one attitude which seems to have been held in common by all Christians is that the carnal nature of man is opposed to the highest spiritual life. Sinfulness lies in bodily desires and worldly ambitions, righteousness in spiritual hope, and a longing for complete union with God.

But it was the patriarchal order of marriage and ideal of a numerous posterity, even more than the material kingdom which set the Mormons in opposition to the Christian world. The following from the revelation on plural marriage suggests again the source from which Mormonism received its ideals and institutions:

> Abraham received concubines and they bare him children, and it was accounted unto him for righteousness, because they were given unto him, and he abode in my law; as also Isaac, and Jacob, did none other things then that which they were commanded. David also received many wives and concubines, and also Solomon, and Moses. . . . .[5]

Although marriage was conceived by the Christians as a sacrament, virginity and celibacy were regarded as the highest and purest life. "The virginity of the holy mother of our Lord," says Bruce, gave to celibacy a virtuous beauty that it had never before possessed. Many of the Christians of Asia Minor began, even in the time of the apostles, to look down upon marriage; and in some of the writings of the fathers we find glowing descriptions of the superior dignity and spiritual worth of celibacy.[1] Tolstoi regards marriage as the service of self, and from the Christian point of view, even a fall, a sin. This being the attitude of the Christian religion toward even the legitimate monogamous marriages it is obvious that a religion which advocated "many wives and concubines" would be condemned as sensual and directly opposed to Christ's spirit and true religion.

---

[1] Gen. 13:14–16.

[2] Exod. 6:4, 8.

[3] Luke 17:21.

[4] Rev. 21:2.

[5] *Doctrine and Covenant,* Section 132:37.

But the materialism in Mormonism is also in part accounted for by the fact that it originated at a time when there was considerable interest taken in communistic enterprises. It was between 1824 and 1830 that Robert Owen established his communistic societies in different parts of the country and especially in the West. Two such communities were established in Ohio, one at Kendal and the other at Yellow Springs. In fact, the nucleus of the first Mormon community was a small communistic society, living at Kirtland, Ohio. The members of this society, before conversion to the Mormon faith, were members of the Disciples of Christ. Practically the entire community joined the Mormon church.

It is also significant that among those who left the Disciples' church to join the Mormons was one of its preachers, Sidney Rigdon. In fact, according to H. H. Bancroft, it was out of the "friendship and association" between Alexander Campbell, Walter Scott, and Sidney Rigdon that the Disciples or Campbellites' church arose.[2] Rigdon undoubtedly became interested in Robert Owens' communistic system through the famous debates carried on between his friend, Campbell, and Owen in 1829[3] (one year before the Mormon church was organized). During the early years when the ideals and institutions of Mormonism were taking shape, Rigdon was intimately associated with Joseph Smith, standing in authority next to him for a number of years. It is very probable, therefore, that Rigdon carried over into Mormonism Owen's communistic doctrine so generally discussed at that time.

[1] W. S. Bruce, *Social Aspects of Christian Morality*, pp. 66–67.

[2] H. H. Bancroft, *History of Utah*, p. 76.

[3] John H. Noyes, *History of American Socialism*, p. 87.

CHAPTER III

ZION IN MISSOURI—GROUP CONSCIOUSNESS AS THE CAUSE OF CONFLICT

It was in Jackson County, Missouri, that the prophet had hoped to fully realize his ideal social scheme. This was the "land of Promise" and "blessed above all other lands." Even today the Mormons refer to Jackson County as the "Center Stake of Zion" and look forward to the time when they may reinhabit this sacred place. Great care was taken in the selection of those who were to settle on the "Promised Land." Only the worthy were to have inheritance there; only those who had fully entered into the Mormon group spirit and were willing to consecrate all their property and be content with such an amount as the bishop thought was actually needed. Every man who would join the new community was required to present a certificate from the bishop at Kirtland as a proof that he was a "wise steward" and worthy of this special blessing.

In August, 1831, the first settlers were received by the authorities who had previously been appointed to buy the land and to "divide unto the Saints their inheritance." The laying of the first log for the building of the first house was an occasion of celebration and ceremony. It was placed by twelve men "in honor of the twelve tribes of Israel." The ceremony of the dedication of the land distributed among the favored pioneers is significant as showing the sacredness with which they regarded their Zion.

Sidney Rigdon stood before the Saints and asked: "Do you receive this land of your inheritance with thankful hearts, from the Lord?"

The audience responded: "We do."

"Do you pledge yourselves to keep the law of God on this land, which you never kept in your own land?"

"We do."

"Do you pledge yourselves to see that others of your brethren who shall come hither do keep the laws of God?"

"We do."

Prayer was then offered and the ceremony ended with the words: "I now promise this land, consecrated and dedicated unto the Lord for a possession and inheritance for the Saints and for all the faithful servants of the Lord, to the remotest ages of time, in the name of Jesus Christ having authority from him. Amen."[1]

---

[1] Evans, *Hundred Years of Mormonism*, pp. 144–50.

These ceremonies suggest the key of the entire struggle between the Mormons and Gentiles in Missouri. The causes of the persecutions are not explained by assuming, as many Mormons do, that the people of Missouri were possessed with bad motives or evil spirits. There probably were many immoral acts committed by individuals among both Mormons and Gentiles and there were undoubtedly many evil-spirited men, even human devils engaged in this warfare, but no more perhaps than could be found in any other frontier community in the country. The causes of the antagonism were psychological. There are unsocial tendencies in human nature which, under certain conditions, will express themselves regardless of the moral attainments of the people. All peoples are at times creatures of group consciousness and group morality as has been plainly illustrated in the recent world-war. The soldiers of one army did not hate the soldiers of the opposing army for anything that they had done as individuals but because they belonged to another group. The Gentiles did not despise the Mormons because of any acts of individuals but because they were Mormons and had set themselves over against all the old settlers of Missouri. Three causes were responsible for the group animosity; these were: (1) purely religious differences, (2) the claim which the Mormons made to land of their Zion, and (3) their attitude toward the negroes.

That the Mormon persecution in Jackson County arose essentially out of differences of religious belief is evident from the content of what was termed the "Secret Constitution," a document by which the non-Mormons of the county bound themselves together for the purpose of expelling the Mormons from the state. The document contains the following:

> It is more than two years since the first of these fanatics, or knaves (for one or the other they undoubtedly are) made their appearance first amongst us, and pretended as they did, and now do, to hold personal communication and converse face to face with the most High God; to receive communications and revelations direct from heaven; to heal the sick by the laying on of hand; and, in short, to perform all the wonder working miracles wrought by the inspired Apostles and Prophets of old. . . . . They openly blaspheme the the Most High God and cast contempt on his holy religion, by pretending to receive revelations direct from heaven, by pretending to speak unknown tongues, by direct inspiration and by diverse pretenses derogatory to God and religion and to utter subversion of human reason.[1]

---

[1] Joseph Smith, *History of the Church*, I, 378. The document was copied from the *Evening and Morning Star* of July, 1833.

Thus, it was not for crimes committed nor for immoral motives that the residents of Jackson County expelled the Mormons but for pretending to have heavenly communication and for possessing spiritual gifts. In other words the beliefs and extraordinary pretentions had made the Mormons a group different from their own. Group consciousness and group morality developed. The individual shifted his personal responsibility upon the group to which he belonged. He lost sight of his personal ideals and sacrificed himself entirely to the group. In this state of mind the individual was led to do things that he otherwise would not do.[1]

Again the Saints declared openly that God had given them the land which both Mormons and Missourians then occupied and even in revelation were they told that the "obedient shall eat the good of the land of Zion . . . . " and the rebellious "shall be plucked out."[2] Although no attempt had been made to gain possession of the land by any means other than by purchase it was rumored that if the land could not be bought some other method might be employed. But rumors were about as effective as knowledge in developing emotions of antagonism. The Mormons had already been made to regard themselves as God's favored ones. It was they who had been blessed with a prophet, with revelations, with spiritual gifts and with a land for their eternal inheritance. The Missourians, on the other hand, were conscious of belonging to a righteous band whose task it was to put an end to the Mormon blasphemy and protect their land from Mormon invasion. Both groups felt that they were fighting for Christ and pure religion.

This group prejudice was further intensified by the fact that the Mormons came from the northern and New England states while the old settlers of Jackson County came from the southern states. Consequently the two groups differed in attitude toward slavery. The Mormons were charged with sowing dissension and raising sedition among the slaves and inviting free people of color to settle in Jackson County. The Mormons denied these charges and declared in their official paper, the *Evening and Morning Star*,[3] that the church had taken no definite stand on the subject of slavery and that "wisdom would dictate great care among the branches of the church of Christ on this subject. So long as we have no special rules in the Church, as to people of color, let prudence guide, and while they as well as we, are in the hands of a merciful God, we say: shun every appearance of evil." This was interpreted to mean that negroes and mulattoes were being invited to become Mormons and settle in the county. Such misinterpretation illustrates how easy it is to find cause for complaint when there is really, as in this case, a long established prejudice. It was not this article nor any particular act of the Mormons or the Gentiles that caused the enmity. This was only an occasion for the expression of prejudices already existent.

---

[1] *Doctrine and Covenants*, Section 64: 27–30.

[2] *Ibid.*, 35–36.

[3] *Evening and Morning Star Extra*, July 16, 1833.

A mere enumeration of acts of misbehavior on the part of either group will not explain the cause of the struggle. These events are only outward manifestations of forces more fundamental. The causes are more deeply rooted. The struggle was not one of individuals against individuals but rather one of group against group.

This spirit of enmity grew until the winter of 1833, when it expressed itself in open violences. The leaders of the church were tarred and feathered, property was destroyed, and the entire Mormon population, which had now reached twelve thousand, was driven into the wilderness. Most of the exiles moved north into Clay County. Having been obliged to leave most of their goods and chattels behind, they were poorly prepared to withstand the winter cold that was then upon them.

The people of Clay County, however, were kindly disposed toward the Mormons, permitting them to occupy vacant cabins, employing some of the men on the farms, some of the women as domestic servants, and others as school teachers. A few families were able to purchase homes but the majority either rented land or were hired to the citizens of the county. But the sympathetic attitude which the citizens of Clay County at first manifested toward the Mormons was short-lived. The Gentiles here had no more in common with the Mormons than did the Gentiles of Jackson County and it was not long before the inhabitants of Clay County learned to regard the Mormons as a distinct and peculiar people. In less than three years they began to take actions to rid themselves of their new neighbors. On June 29, 1836, the citizens assembled in the courthouse to consider possible means for inducing the Mormons to leave their country. It is interesting to observe that here, as in Jackson County, it was not overt acts or series of crimes which caused the citizens to feel uncomfortable in the presence of the Mormons but rather an indefinable something that made the Mormon group different from their own. An extract from the minutes of the citizens illustrates the situation:

> They are Eastern men, whose manners, habits, customs, and even dialect, are essentially different from our own. They are non-slaveholders, and

> opposed to slavery, which in this peculiar period, when abolition has reared its deformed and haggard visage in our land, is well calculated to excite deep and abiding prejudices in any community where slavery is tolerated and protected.
>
> In addition to all this, they are charged, as they have hitherto been, with keeping up a constant communication with our Indian tribes on our frontiers, with declaring, even from the pulpit, that the Indians are a part of God's chosen people and are destined by heaven to inherit this land, in common with themselves. We do not vouch for the correctness of these statements; but whether they are true or false, their effect has been the same in exciting our community.[1]

Thus the Saints were requested to leave Clay County, not because of misconduct either legally or morally, but because their religious tenets, their habits, customs, dialect, etc., were different from those of the other inhabitants. They were asked to leave because they were non-slaveholders and because they declared the Indians to be their brethren. What could more clearly express group psychology and even group morality than these accusations? Human society is so constituted that unless individuals of the different groups can find something in common they will not associate. The Mormons refused to have anything in common with their Gentile neighbors and consequently the only thing that would insure peace was isolation. This fact was now beginning to be recognized by both Mormons and Gentiles.

To avoid serious persecution such as they suffered in Jackson County the Saints moved at once into the territory attached to Ray County. They petitioned the state for the privilege of organizing into a county. Their petition was granted and the Mormons thus became the founders of Caldwell County. Here the Saints grew rapidly in wealth and population. By the autumn of 1838 they had opened in Caldwell and adjoining counties two thousand farms and had erected many houses, hotels, stores, and shops of all kinds.

The Saints were beginning to feel that they had now come to a realization of their hopes. God had in a sort of indirect way led them to a place where they were to enjoy peace and prosperity.[2] This seemed to give them a feeling of strength and courage and, in the case of some individuals, resulted in a boldness which had serious consequences. For example, Sidney Rigdon unwisely gave expression to his feelings in a Fourth of July speech in 1838. The following is an extract from his oration:

---

[1] Joseph Smith, *op. cit.*, I, 450.

[2] H. H. Bancroft, *Bancroft's Works*, XXVI, 119.

> We take God to witness and the holy angels to witness this day that we warn all men, in the name of Jesus Christ, to come on us no more forever. The man or set of men who attempt it, do it at the expense of their lives; and that mob that comes on us to disturb us, there shall be between us and them a war of extermination, for we will follow them till the last drop of blood is spilled, or else they will have to exterminate us for we will carry the war to their own houses, and their own families, and one party or the other shall be utterly destroyed.[1]

But Rigdon's pride was soon humbled and the prosperity of the Saints was soon to be replaced by poverty. The two years of peace was but a calm before the storm. A disturbance in Davis County in August of that year marks the beginning of the trouble which finally resulted in the expulsion of the Mormons from the state. Attempts were made to prevent certain Mormons from voting. The latter insisted upon their rights as American citizens and cast their votes, but not until after a skirmish in which several on both sides were wounded. News of this circumstance spread like wildfire through Davis and Caldwell counties. A general uprising followed. The leading citizens tried to quiet matters but to no avail. Conditions went from bad to worse. Finally the affairs became so alarming that Major-General Atchison called out the militia of Ray and Clay counties under the command of Generals Doniphan and Parks. General Parks with a small army went to Davis County and Doniphan with a small body of men went to Dewit to put down a mob uprising at that place.

That the Saints must again leave their homes became evident. They all gathered at Far West, the county seat of Caldwell, and from there they were compelled in midwinter to leave the state. Generals Doniphan and Parks endeavored faithfully to protect the Mormons from mob-violence, but with little avail for they were struggling against too many odds. They were outnumbered by the mob and their own soldiers were, themselves, prejudiced against the Mormons. Governor Boggs remained indifferent at first and maintained that since the Mormons had brought the trouble upon themselves it was left with them to fight it out with the mob. He could give them no help. Later, however, for no good reason yet known to historians, he ordered General Clark to rally the state militia and drive the Mormons from the state.

Attention should be directed toward two significant results of the Mormon residence in Missouri. In the first place Mormon group consciousness was taking definite form. The rapid building up of a colony in a county, and quick development of prejudice and persecution convinced the Mormons as well as the non-Mormons that the two groups had nothing in common. Not knowing the cause of the bitter hatred between the groups and the sympathy which developed within the groups, a mysticism was apparent in the consciousness of both. God symbolized the spirit of love which the members of the same group bore toward one another, and the devil symbolized the spirit of hatred which existed between the groups.

---

[1] *Ibid.*, p. 120.

In the second place the Mormon social ideal or Zion also received its definite form. Jackson County, Missouri, is to this day regarded by the Saints as sacred land on which they are to build their Zion. This concept has played no small part in Mormon history since the expulsion from Missouri and it is sure to play an important part in the future.

CHAPTER IV

ZION IN ILLINOIS—AN INDEPENDENT CITY

Driven from Missouri the Saints found refuge in Illinois. There our story repeats itself. From one community they were expelled by an armed force and in another received with open arms of friendship. In one state they were deprived of their homes and property; in another they were given shelter, food, and clothing. In one state they were considered outlaws and deprived of the rights of citizenship; in another state they were not only given the rights of citizenship but were permitted to establish an independent city whose charter allowed them to organize an army for protection. Why the attitude of these two friendly states should be so different toward the Mormons, historians have thus far failed to answer. It is obvious that, had the Mormons been expelled from Missouri on account of theft, murder, or any illegal or immoral conduct whatsoever, knowledge of this would have been had by the people east of the Mississippi and their reception would have been very different.

But the Mormons were expelled from Missouri not on account of criminality but because of peculiarity. They were expelled for reasons that could not be easily communicated. They were driven out because they practiced their creed, "mind your own business." They believed that their business was absolutely distinct from that of their gentile neighbors. They had their own peculiar religious interests, their own economic order, and to a certain extent their own political interest and control. They desired no interest or co-operative intercourse with people outside of their own group. Such an attitude will be treated with indifference for a short time, but an entire absence of common interests leads inevitably to a severance of friendly relations. This was repeatedly illustrated in Missouri and later in Illinois. Two peoples cannot live together unless there is some common ground, some natural interest or condition for co-operation. It is a vital principle in human society that "he who is not for us is against us." Human nature cannot tolerate indifference. Only by association could the people of Illinois be made to understand that the Mormon people were not to become one with them.

Quincy, Illinois, became the resting-place for the greater number of the Saints until a permanent place was determined upon. But the prophet was not long in selecting another Zion. Commerce, Hancock County, was soon selected as the central spot for the new community. Though at that time swampy and unhealthful it was conveniently located as it was almost encircled by the Mississippi. It was drained of its impure water, renamed, and became in a short time the beautiful city of Nauvoo. Besides the land in Commerce, much land in Iowa was purchased by the characteristic Mormon method, first by the church, being later sold or given to its members according to their need and financial ability.

At first no attempt was made by the prophet to gather his people to Nauvoo. They were permitted to locate at will in different parts of Illinois and Iowa. But in the winter of 1840–41 the legislature of the state granted to the Mormons a very liberal charter. Under it they were given almost complete political and judicial control of affairs within the city of Nauvoo. In May following, all the Saints living outside of Nauvoo were called in to help build up the city and its temple. The call came as a revelation.

> And again, verily I say unto you, let all my Saints come from afar,
>
> And send ye swift messengers, yea, chosen messengers, and say unto them: come ye, with all your gold and your silver, and your precious stones, and with all your antiquities; and with all who have knowledge of antiquities, that will come, may come, and bring the box tree, and the fir tree, and the pine tree, together with all the precious trees of the earth; and build a house to my name, for the Most High to dwell therein.[1]

To the Saints this was indeed a divine call. They were to build a new Jerusalem and a temple like the Temple of Solomon of "fir trees" of "precious stones" and "antiquities."[2] They responded promptly to the call. Within a few months the city grew from a population of five thousand to twenty thousand. It soon became the largest city in Illinois. Hotels and workshops and business houses and enterprises of all sorts sprang into existence as it were in a day. There were many industrial organizations, not for individual gain, but for the building up of the city. It was the intention of the prophet to make Nauvoo self-supporting and entirely independent of outside business and industrial life. A city government was established and also a military organization. The prophet became mayor of the city and also lieutenant-general of the Nauvoo Legion.

But the effect of this wonderful group solidarity was not long to be expressed in terms of prosperity and city building. The very factors

[1] *Doctrine and Covenants*, Section 124:25–26.

[2] I Kings 5:6–8; 6:21.

which created strong solidarity within also developed a strong opposing group without. Here as in Missouri when the non-Mormons found that they were excluded from all the Mormon enterprises they became suspicious. There was something wrong with a people who were always all for or all against a political measure. Little by little they began to feel that since the Mormons' religious, economic, and political interests were so exlusively Mormon interests that they must be opposed to their own. Joseph Smith, whom the Saints regarded with such reverence, now received the attention also of the Gentiles; by them he was regarded not with reverence but with contempt and hatred. In fact everything that was considered of vital concern by the Mormons became now of vital concern to the gentile group. But what was an object of love to one group was an object of hate to the other and what was regarded with reverence by the one was regarded with contempt by the other.

The attention of both Mormons and Gentiles in Illinois now became centered in the prophet and never before had the latter been more active than during the last two or three years of his life. On one day he would be presenting to his people a new revelation; the next day he would appear before them as head of the Nauvoo Legion. He might one day be under arrest and on trial before a court in Illinois; and the next day announce himself a candidate for president of the United States. The prophet recognized his activity and regarded it as a source of strength. He says: "Excitement has almost become the essence of my life, when it dies away I feel almost lost. When a man is reined up continually he becomes strong and gains knowledge and power; but when he relaxes for a season he loses much of his power."[1]

The prophet was arrested a great many times and each occasion tended to magnify his greatness in the minds of his people. Wilford Woodruff describes a reception the people gave their leader upon his return after a hearing before a court: "Five days later . . . . the citizens of Nauvoo went out in great numbers on horseback and in carriages to meet the prophet. The whole scene was a demonstration of joy. He was escorted home by a band of music and by the great multitude that had gone out to meet him."[2]

Inspired by the presence of thousands of his people and by the glorious reception which they extended him, he gave direct expression to his emotions. The following selections from his address reveal his temperament and also indicate his relation to the people:

---

[1] Statement by Wilford Woodruff, quoted by Cowley in *Life of Wilford Woodruff*, p. 176.

[2] *Ibid.*, p. 182.

> "I want you to learn, O Israel! what is for the happiness and peace of this city and its people. Our enemies are determined to oppress us and deprive us of our rights and privileges as they have done in the past. . . . .
>
> "There is a time, however, when forbearance ceases and when suffering longer without resistance is a sin. I shall not bear it any longer, I will spill the last drop of blood I have rather than endure it; and all who feel that they will not bear it any longer say, 'Aye'. . . . .
>
> "However, I shall restrain you no longer, from this time forth. If occasion require I will lead you to battle, if you are not afraid to die and to spill your blood in your own defense you will not offend me. Be not the aggressor. Bear until they strike you on one cheek and then offer the other. They will be sure to strike that also; then defend yourself and God will bear you off victorious. If I am under the necessity of giving up our chartered rights, privileges, and freedom for which our fathers fought and bled, and which the constitution of the United States as well as this state grants to us, I will do it at the point of the bayonet and sword. . . . .
>
> "It did my soul good to witness the manifestation of your feelings and love toward me. I thank God I have the honor to lead so virtuous and honest a people, to be your law-giver as Moses was to the children of Israel. Hosanna! Hosanna! Hosanna! to the most high God! I commend you to His grace and may the blessings of Heaven rest upon you, I ask it in the name of Jesus Christ. Amen."[1]

Joseph Smith possessed the essential traits of a prophet. He was highly sensitive to the impulses of his people. This placed him in complete harmony with them. He embodied their spirit and in this sense he was not only a prophet for them but was made a prophet by them. He received his inspiration from the group and in return reflected its life in such a way as to give it restimulation. The group felt the emotions but needed a prophet to make them more objective or give more concrete expression to them. Such emotional expressions as these: "I will spill the last drop of blood I have rather than endure it," "I will lead you to battle," "Defend yourself and God will bear you off victorious," are in a very real sense group expressions. It was the group speaking through its prophet. When the emotions were expressed in this form they became stimuli for even more powerful emotional responses. It is true that the whole life of the people was centered in their prophet, but it is equally true that the spirit and power of the prophet came from the group.

---

[1] Statement by Wilford Woodruff, quoted by Cowley in *Life of Wilford Woodruff*, pp. 184–86.

The one event which has made the name of Joseph Smith immortal in the Mormon community is his martyrdom in Carthage jail. He was murdered while in the zenith of his life, just at the time when the attention of his entire people as well as his enemy was focused upon him. The time of his death and the manner of his death has established a sentiment in the Mormon people toward him and his enemies that has remained even to the present time and will perhaps always remain as an element in the consciousness of the Mormon people. The following hymn illustrates the nature of this sentiment and the manner in which it is transmitted:

Praise to the Man who communed with Jehovah!
Jesus anointed "that Prophet and Seer"
Blessed to open the last dispensation;
Kings shall extol him and nations revere.
Hail to the Prophet, ascended to heaven!
Traitors and tyrants now fight him in vain;
Mingling with God, he can plan for his brethren;
Death cannot conquer the hero again.
Praise to his memory, he died as a martyr,
Honored and blest be his ever great name!
Long shall his blood which was shed by assassins
Stain Illinois while the earth lauds his fame.
Great is his glory and endless his priesthood,
Ever and ever the keys he will hold;
Faithful and true he will enter his kingdom,
Crowned in the midst of the prophets of old.
Sacrifice brings forth the blessings of heaven;
Earth must atone for the blood of that man;
Wake up the world for the conflict of justice;
Millions shall know "brother Joseph" again.[1]

In the death of Joseph Smith and the expulsion of the Saints from Nauvoo the first period in Mormon history has its dramatic ending. It is impossible to find a situation which illustrates so well the effect of strong group sentiments. Five times did the Mormons establish settlements and five times were they driven from their homes by mobs. In each place they were kindly received at first, treated as friends, but became after a short time objects of extreme hatred and for no other cause than that they were a peculiar people. We may thus generalize our conclusions of the first great maladjustment in Mormon history. (1) That the extraordinary pretentions of the Mormons which made them unpopular among the citizens of Missouri and Illinois was the first cause of the conflict. (2) That the conflict itself created solidarity within the group and prejudice between groups. (3) That the sentiments thus nourished by constant group interaction grew in intensity and resulted finally in mob uprising.

---

[1] Selected from the *Songs of Zion.*

Although the great conflict with the Gentiles practically ended with the expulsion from Nauvoo, its psychological effect still remains and functions vitally in the life of the people. The struggle was too intense and the emotional excitement too great to be quickly eliminated from their consciousness. There is a tendency to rehearse this great conflict in their religious services. The expulsions from Missouri and from Illinois are popular themes for public addresses. In oratorical contests many young Mormons have won prizes with this theme. But perhaps the most common appearance of the mental effect of the great conflict is in the hymns of the church. The following expressions taken from some of the hymns illustrate how dominant is this element of conflict in the consciousness of the people. "All thy foes shall flee before thee"; "Enemies no more shall trouble; all thy wrongs shall be redressed"; "All thy conflicts, all thy conflicts end in an eternal rest"; "All her foes shall be confounded, though the world in arms combine"; "While the enemy assaulteth shall we shrink or shun the fight"; "On the neck of thy foes thou shalt tread."[1] The one element common to all these expressions is that of conflict with an enemy. This is one of the most effective means of transmitting the old group sentiments from one generation to another.

But in addition to the effect on the sentiments, the psychology of group conflict is manifest in a more objective way. It is in the peculiar character of some of the religious forms. They are unlike that of the sectarian world. The Mormons had no inclination to compromise with the outside world. This tendency has grown out of the old classification, the Mormons and Gentiles, the Children of God and the Children of the Devil, their brethren and their enemies. Nothing good can come from an evil source, consequently whatever originated in Mormonism was of God and whatever came from Babylon was of the Devil. It was the peculiarity of Mormonism which caused the conflict. And it was the conflict which caused these peculiarities to continue. There would have been no strife with the gentile world had it not been for Mormon peculiarities and there would have been no Mormonism as we have it today without this conflict. Thus we have in Mormonism peculiar religious ceremonies, a peculiar marriage institution, a distinct economic order, and a unique priesthood with its own institution for social control.

---

[1] Selected from the *Songs of Zion*.

But while we are emphasizing the permanent effect of the great conflict in Missouri and Illinois, it is not intended to minimize the significance of the second great struggle. The struggle for existence in the Rocky Mountain country had equally important psychological and social results. We shall observe how the new problems reshaped, changed, and even eliminated some of the older institutions. We shall also observe how the group sentiments of the first conflict were strengthened and how other sentiments developed out of the new life.

PART II

MALADJUSTMENT BETWEEN MORMONS AND NATURE

CHAPTER V

THE MORMON MIGRATION—FROM A CONFLICT WITH MEN TO A STRUGGLE WITH NATURE

With the expulsion from Illinois began the great Rocky Mountain colonization for which the Mormons are so well known. This is the beginning of a new era in Mormon history and marks as well a forward step in American Western movement. Although during the first fifteen years of their history the Mormons were engaged in establishing colonies and building cities—an aim which has characterized their history throughout—the great obstacles were not presented by nature but by their human enemies; the maladjustment was with men. The struggle of the second period was with nature, the economic condition of an isolated mountainous and arid region, inhabited by Indian tribes. It was the successful manner in which the Mormons met and overcame their obstacles that entitles them to a place in the history of the advancement of industrial America.

"To your tents, Oh Israel!" was the command of the new leader who was given the task of directing the Mormons in this pioneering enterprise. Brigham Young became the prophet to the Mormons after the death of Joseph Smith. And it was well that a change of leadership should come at this time. The situation demanded it. Joseph Smith was a spiritual-minded idealist; he seemed to serve the purpose of his group when the conflict was social, religious, and spiritual. Brigham Young was a materialist, very practical-minded and well prepared to direct the Mormons in their struggle with material problems. It seems proper that Joseph Smith should be the founder of a religion and that Brigham Young should be the founder of a state.

Professor Ames in his book, *The Psychology of Religious Experience*, explains the conditions out of which social leaders develop:

> The underlying condition is . . . . that of a vital, urgent life for the whole social group. Great men have arisen in crises when the nation or race felt the stress of unusual tension and opportunity. At such times the currents of thought and feeling are deepened and quickened. Not only are the unusual men demanded by the situation, but they are created by it through the stress and stimulation and experience which it furnishes.[1]

---

[1] P. 344.

We can hardly find a more vivid example of the principle that a new problem forces readjustment than is found in this transition period of Mormon history. The new need created a new type of leadership. The spiritually minded, idealistic leadership gave way to common sense and practical authority. The emotional, inspirational, and impulsive control gave way to deliberative foresight and direction. The loose and incomplete organization was transformed into a more complete, firm, and definite system based upon immediate practical demands.

Brigham Young was once asked if he regarded himself a prophet and replied: "I am of profit to my people." And so he was. As a leader he met the problems confronting his people in such a masterly way that he soon seemed to them a more than ordinary man. He was at first regarded as one of the twelve apostles, the president of the quorum of the apostles. But as his importance to the community became recognized and as the people tended more and more to look to him for leadership, he became clothed with a sort of spiritual sacredness that seemed to lift him into a sphere by himself. He became their "Prophet, Seer, and Revelator."

But what were the problems that demanded this new type of leadership? They were many and varied in character, but they may be summarized under three general economic problems: immigration, colonization, and economic independence. More specifically: (1) How were the thousands of Mormons to be transported from Illinois to the Rocky Mountains? (2) How were they to survive when they got there? (3) In their isolation how could they maintain permanently, as a community, an independent industrial and commercial life? The problems were not all grasped at once by the people. Even Brigham Young was unable to define all of them at the beginning. The problems became organized in the minds of the pioneers while they were struggling with them. We shall treat the problems in the order in which we have stated them for that, in general, is the order in which they presented themselves. But it should be observed that they are not independent of each other. They are in reality three aspects of the one big problem, the establishment of a great and independent Zion in the Rocky Mountain country.

It was on February 4 when the exodus from Illinois actually began, although weeks before this date the people had been engaged in making preparation for their journey. Land and houses were exchanged for cattle, horses, mules, wagons, tents, farm tools, seeds of all kinds, and minor traveling equipment.

The organization for the great journey was very efficient. And it must necessarily have been so in order to move such a great body of people a distance of fifteen hundred miles over trackless prairies, sandy deserts, and rocky mountains. Brigham Young instructed his people thus: "We will have no law we cannot keep, but we will have order in the camp. If any want to live in peace when we have left this place, they must toe the mark."[1] Not all the rules that governed the pioneers were given at any one time but were made as the occasion demanded by Brigham Young and the twelve apostles who represented the church and whose word was law.

The following quotation from a pamphlet published by the historian's office of the Mormon Church in 1869, gives a detailed account of the camp organizations and shows the emphasis placed on community interest even at the expense of the individual.

> The companies for the plains were organized at the Elk Horn river, about 18 miles west of Winter Quarters, now Florence, Nebraska, into companies of hundreds, fifties, and tens; each fifty was provided with a blacksmith and wagon maker with tools for repairing wagons and shoeing animals. Three hundred pounds of breadstuff were required for each person emigrating, and a good gun with 100 rounds of ammunition for each able-bodied man. Many cows were worked in the yoke. Each family was also required to take a due proportion of seed grain and agricultural implements. Every wagon, load, and team was inspected by a committee, and none were allowed to start on the plains without the required outfit. A strict guard was kept over the cattle by night and day, also in the camps, which were formed in an oval shape, the inside making a corral for the stock. Pigs and poultry were carried in coops attached to the wagons.
>
> No person was allowed by the rules to wander about, not even to hunt game, except under special directions, and by these precautions, no person was lost and but few accidents occurred, and the loss of animals was small, although we traveled ten hundred and thirty-four miles, from the Missouri river to Salt Lake City, through an uninhabited and desert region. Saturday afternoon was usually occupied in washing, baking, repairing wagons, and shoeing animals, and Sunday was a day of rest and worship. Morning and evening prayers and songs of praise were never omitted in the camps, and occasionally a dance was enjoyed, the companies generally being favored with musical talent.
>
> Thus the refining influences of society and civilization were continually felt and kept in view, and the moral status of the camps preserved inviolate through all the fatigues, hardships, exposures, and vexatious annoyances of the entire journey.[2]

This may appear to be a very arbitrary and extremely rigid system, but when we realize the seriousness of the whole situation it should not seem unnecessary. These people were traveling in constant danger of attack from unfriendly Indians and perhaps from some few dissatisfied

[1] Quoted in *Tullidge's Quarterly Magazine*, I, 8.

[2] *Answers to Questions*, p. 17.

members of their own group. They formed a very large body and were in danger of starvation as well as contagious diseases. A routine method and a most rigid discipline were therefore desirable precautions against serious disturbances.

A most admirable plan, looking to the needs of the Saints who were to follow the pioneers, was the establishment of farming stations along the line. Most of these were located east of the Missouri River where the rainfall was sufficient to assure a crop. One was established at Garden Grove, in Iowa, one-hundred and fifty miles from Nauvoo, another on a branch of the Grand River, and the largest one at Council Bluffs, on the Missouri River. These places were selected by men sent out in advance of the pioneer wagons. As soon as the main body arrived at these resting-places all the men were promptly organized and put to work, some cutting logs, splitting rails, others building houses and fences, and still others were engaged in plowing and planting. Thus industrious settlements sprang up in the wilderness as it were by magic. In no time of their experience have they found their communistic scheme quite so practical as in the conducting of these farming stations. Thus the pioneers who reached these stations in the spring would plant the seeds and the autumn travelers would reap the harvest.

On July 24, 1847, the first pioneers entered Salt Lake Valley. The problems of the plains had been successfully met. And the Mormons had found a land of peace if nothing else could be said in its favor. They were happy in the victory attained but fully realized that a perplexing problem of a different nature now confronted them.

In order that the reader may fully appreciate the new problem confronting the people and to properly evaluate the methods which Brigham Young and his associates employed, a few facts are presented. By the end of the first summer about four thousand people had entered the Valley. They were without surplus food, having brought with them only sufficient to meet their needs on the journey. They were practically without implements or machinery of any kind. They came from the fertile lands of Illinois and Missouri and with agricultural knowledge which, although well suited to the conditions of that country, was entirely unsuited to the dry lands of Utah. They had become familiar with the theory of community enterprise and had even experienced it under certain conditions but they were not trained in such co-operation as was required in irrigation, road building, fort building, and other activities peculiar to the new country. After the pioneers had been in the Valley a little more than a year the bishops of Salt Lake wards took an inventory and officially reported that there was little more than three-fourths of a pound of bread for each person. It is not surprising, therefore, to learn of their eating roots and meat of cattle killed by wolves and even boiling the hides that had been used for roofing the cabins. Some were without clothing and were compelled to cover themselves with the skins of wild beasts when even such could be had.

The psychological effect of these hardships, coming as they did immediately after the persecution in Missouri and Illinois, cannot be overemphasized. The Saints naturally regarded their poverty and misery and the loss of their loved ones as results of the injustice imposed upon them by their gentile enemies. Isolation did not cause them to forget these enemies but, on the contrary, every hardship they endured was a bitter reminder of those who had deprived them of home, of comfort, and of happiness. On the other hand, the thoughtful supervision of Brigham Young and the leaders of the group and the kind helpfulness manifested by the brethren developed a consciousness of Providential care. It is in just such situations of extreme suffering, with the accompanying feeling of dependence upon others for sympathy and assistance, that the Providential Spirit comes to consciousness. At such times the representatives of the group, the prophet, the bishop, the elder, became clearly the representatives of God. Whatever else Providential care may be, it is certainly the spirit of comfort in times of distress.

The great migration was also a splendid discipline for the extensive colonizing enterprises which followed. The careful organization necessary for the moving of such a great body of men, women, and children proved equally efficient in the establishment of numerous small colonizing companies in the mountain valleys. And also the type of discipline which the members of the church received on the plains certainly strengthened the control of the priesthood. The power of church authority was so impressed upon the minds of the Saints during their journey from Illinois to the Great Salt Lake Valley that it tended to remain for years afterward, even when rigid authority was unnecessary and sometimes disadvantageous.

CHAPTER VI

MORMON COLONIZATION

The question of social control was not so perplexing as was that of making a living. The Saints were anxious to work out their own methods of government. When they entered the Valley of Great Salt Lake it was Mexican territory, but was ceded to the United States in 1848. In 1850 the United States government organized the Territory of Utah and appointed Brigham Young governor. From 1847 to 1857 the political control was left absolutely to the Mormon people. This was the opportune time for them to try out their social institution. The priesthood was to rule over Israel. The old marriage system of Abraham and David could be re-established. The communistic system and the order of Enoch should demonstrate their practical value. We shall observe in this and the following chapter the function of these institutions in meeting the new problems.

The problem of colonization presented three aspects: (1) How can the arid country be made to sustain human life? (2) How can the Saints gain possession of all the productive valleys of the Rocky Mountains? (3) How may their population be increased?

1. How to make the arid region produce food to sustain life was by far the most imposing of the many questions that engaged the minds of Brigham Young and his associates. The Saints had been told by men of experience, traders in the Rocky Mountain region, and by statesmen at Washington, that this vast Mexican territory was valueless and would sustain life in neither man nor beast. Thus, before entering the Valley, the active minds of the camp were undoubtedly focused on this question. The possibility of taking water from the mountain streams and distributing it over the dry lands had no doubt been suggested by someone who felt keenly the task of feeding a multitude in the desert, for the very day on which they arrived in the Valley the experiment was made.

While irrigation had been practiced in Egypt for many ages and had been in use in a simple form among some Indian tribes of the Rocky Mountains, it was Brigham Young and the Mormons who gave it a scientific beginning. The task of constructing canals in a mountainous country and of distributing the water in fair proportion among a community of farmers was an accomplishment as meritorious as any of the scientific discoveries of significance in the industrial history of the country.

But it is irrigation in relation to the great colonization enterprise which concerns us here. In the first place, it was irrigation which made it possible for any large number of people to live in this arid and isolated country at that time. Starvation would certainly have come to the thousands of Mormons had it not been for this most important discovery. The practical demonstration of irrigation made possible a great future for the new country and its inhabitants. Brigham Young could now see in vision the Saints growing in numbers and becoming a "mighty people." He saw them occupying every valley in that great expanse of country. He saw the water of every stream diverted from its natural course to cover the dry lands, making them produce useful crops in abundance. He saw the fulfilment of ancient predictions that Zion should be established on the tops of the mountains and that all nations should flow unto it. This was, indeed, the "Promised Land," and the place where God's Kingdom was to be established.

Irrigation began on a co-operative basis. The task of bringing water, five, ten, and twenty miles through canals cut deep into hard rock, along steep mountain sides and through soil containing roots of trees and brush was not accomplished by a few individuals. It required the united effort of an entire community. This was always taken into account in sending out colonizing companies. The size of the company depended upon the character of the irrigation project that must be undertaken as well as upon the number and size of the streams of water in the locality. When the canals were completed and water was brought to the land there was usually enough for each man to irrigate a garden plot and a ten- or twenty-acre farm. In the construction of the canal each man was expected to contribute his labor and would receive water (water right) in proportion to his contribution. The canals and the streams of water became thus the property of the community.

The social and economic results of co-operative irrigation are significant. The country was settled by colonizing communities rather than by individuals going out by themselves. The individual received the assistance and protection of the community, and the community in its turn was strengthened by his efforts and at the same time avoided the evil of private monopoly of large tracts of land and streams of water. Consequently, there were in Utah, until recent years, very few large farms. Small farms and intensive cultivation was the natural result of the Mormons' irrigation system. This situation has facilitated the development of the beet sugar industry which is now so important throughout the entire Mormon country.

But while co-operative irrigation, small farms, and community life still prevail in Utah, there is now a tendency for large private concerns to buy extensive tracts of land from the government and construct large irrigation canals and reservoirs and to sell the land and the water to the farmers. Thus, we shall see that in the agricultural, as in every other line of economic activity in the Mormon community, the old co-operative community system is giving way to large corporate methods of business control.

2. In regard to the second aspect of the colonization questions, it was the policy of Brigham Young to have his people settle at the earliest possible date upon all the irrigable land in the valleys. He, therefore, hastened to establish colonies in the many valleys of Utah, and in Idaho, Arizona, Colorado, Nevada, and Wyoming. These colonizing projects were called missions, and properly, too, since the building up and the enlargement of Zion was the great social aim. During the general conferences of the church at Salt Lake City, the heads of families would be called to take these missions. These men with their families, under the direction of a bishop or a bishop's councilor, constituted a colonizing company. The bishop had full charge of all the interests of the company. He directed the surveying, plotting, and distributing of the land. He supervised the building of the fort, the construction of canyon roads, canals, fences, and all the co-operative work of the community. He was also the lawgiver and in case of dispute between members of the company, he was chief arbitrator.

The typical method of establishing a colony was as follows: The land was surveyed and plotted into five- and ten-acre lots. These lots were then distributed. The number and size of the lots that each man received depended upon the size of his family. If a man had five wives and each wife had sons old enough to cultivate the land he might receive five times as much land as a man who had but one wife. If a man were a bachelor, he might receive still less land. The writer interviewed an old gentleman who had assisted in surveying and plotting the land on which Ogden City now stands. He thought that due to his valuable service and because he was among the first to settle there, a good share of the choice land would come to him. But how disappointed he was, when the bishop gave him, on account of his being a bachelor, only a small piece of gravel land next to the mountain. The city lots were similarly

It was preached in every religious meeting; special pamphlets were published by the presidency of the church and sent out among the people; the papers and magazines of the church were filled with discussions of the theory and practice of the system. Two lines of argument were presented: one, that it was the divine order revealed to the Prophet Joseph Smith and that practiced by the disciples of Christ and by the Prophet Enoch; the other, that it would serve a present practical purpose. The possibility of the United Order meeting the social needs was the main reason why Brigham Young advocated it at this time. If he thought that ideals and methods of Joseph Smith were practical he would urge them upon his people but when they proved to be unsuited to conditions he would make such substitutions as he thought proper. Many of his associates were more anxious than he to force into existence institutions that had no other justification than that they were established by Joseph Smith or taught or practiced by biblical prophets. The following statement of E. W. Tullidge made in 1876 illustrates Brigham Young's methods:

> In the altered state of things that quickly ensued, Brigham Young met all the conditions. Indeed, so rapid and varied were his transformations during the next few years that he may have often seemed to have been reversing himself and his policies. The fact is he was testing his problems, now urging his social ideas with all the might of his matchless will, now accepting with resignation the degree of progress attained by the people. This has been strikingly illustrated in his efforts to transform the Mormons into the great co-operative community, and to establish in Zion the Order of Enoch.[1]

A few illustrations will show the character and extent of the organization as developed at that time. In some communities it was merely a loose co-operative undertaking, in other places it was highly communistic. In Hyrum, Cache County, for example, the people owned in common the sawmill, the tannery, and the store, but the individuals owned the farms, the houses, and the cattle. In Price, Carbon County, on the other hand, the people lived together as one large family. Their farms, mills, horses, cattle, wagons, houses, and everything except the clothing they wore were owned in common. They all ate at the same table, and the women prepared the food and washed the dishes co-operatively. In Brigham City, the organization included about fifteen departments, each under the management of a foreman who, besides directing the labor, kept the accounts of his department. This institution had a woolen mill, a saddle and harness factory, and a tailor department.

---

[1] *Life of Brigham Young*, 442–43.

They produced men's suits and fur and straw hats for both men and women. The cabinet department supplied the homes with furniture. Besides these departments there were sawmills, machine and wagon shops, a large dairy, and a cattle and sheep herd. In fact nearly every material good which comes under the name of necessity was produced in this little communistic village. It also supplied other communities with manufactured articles. Most of the surplus goods were sent to Salt Lake City and sold to the Zion's Co-operative Mercantile Institution, which in turn made such distribution among the settlements as was needful.

Through the Mormon system of co-operation and the United Order the manufacturing establishments grew from 533 in 1870 to 1,166 in 1880 and this notwithstanding the railroad transportation facilities with the East and the constant effort of non-Mormon merchants to place eastern-made goods on the Utah market.[1] The explanation of this rapid growth of the manufacturing industry in Utah at that time and its subsequent decline is rendered more obvious when we consider the great co-operative mercantile movement that was promoted at the same time.

The United Order and the co-operative manufacturing institutions were incomplete without the mercantile business. A certain amount of exchange was necessary within the communities and between communities. An organized mercantile institution was necessary to facilitate such business relationship. The most independent system that a community could possibly develop found itself lacking in some things. A tannery and a woolen factory could not be economically established in every community. On account of varied altitude, different degrees of soil fertility, the nearness to good water-power and timber lands, a degree of division of labor had to be practiced among the communities.

Furthermore there were many commodities very much needed by the people which they, with all their diversity of industry, could not produce in Utah. Most of the machinery used in manufacturing had to be imported. The completion of the railroad and the importation and the advertisement of a great variety of eastern-made goods made many people dissatisfied with home-made clothing and notwithstanding the fact that the authorities of the church condemned these commodities as luxuries and the purchasers as vain and worldly, the goods were constantly coming in and were being distributed among the people. Thus since the people would have the eastern-made goods it was advisable for the Mormons to handle the business and enjoy the profits. Moreover it was made clear to the leaders of the church through experience with the gentile merchants that the interest of the private concerns was plotted and distributed. At first the houses were built to serve as a fort but as the community grew larger each man built his house on his city lot. Thus a community of little more than thirty families had its city lots in the central part and the farms and meadow lands on the outskirts. This arrangement was desirable not only because of the social advantages it gave, but because it afforded better protection from Indians.

---

[1] Hollister, *The Resources . . . . of Utah*, p. 55.

3. The third aspect of the problem was one of numbers. As an empire builder Brigham Young needed a large population. If the Mormons were to occupy all the valleys of the Rocky Mountains they must become greater in numbers. Two ways presented themselves as means of increasing the population, the one through proselyting and immigration, the other by increasing the birth-rate. Each of these might be presented as a direct religious appeal, the one to "go into the world and gather out the honest in heart" and the other to "multiply and replenish the earth." Both of these from the very beginning of the church have been considered sacred obligations. It was for Brigham Young to make these principles serve in solving his practical colonization problem.

The church began a regular system of immigration shortly after the arrival of the early pioneers. Proselyting had been actively carried on from the time the church was organized and now there were thousands awaiting an opportunity to "gather to Zion." In England and the Scandinavian countries, as well as in the eastern states, there were many converts who were too poor to undertake immigration to Utah. These were all anxious to come and take part in the building up of the Kingdom and Brigham Young was no less anxious to have them come. Although poor, each able-bodied man and woman was an added unit of strength to the great Mormon enterprise, and the poor converts, when once planted in the new country, gained material advantage, for many of them were without homes in their native land. When these people were offered the loan of transportation expenses they were not slow to accept this opportunity to move West. Few there were of the great number who came to Utah in those early days who realized the physical toil required to make new homes in Zion.

The immigration was conducted under an organization known as the "Perpetual Immigration Company." The presidency of the church stood at the head of the organization and directly controlled its operation, but every member of the church was expected to make contributions to it and thus become a member. It was called perpetual on account of a provision that those who contributed were not to be remunerated and those who were assisted were to return the money with interest, thus making it a perpetual and ever-growing concern. The people were not expected to pay cash but anything of general value, such as horses, cattle, sheep, wagons, grain, and labor, was received as contribution. The receipt and use of all these things by the company made it possible for nearly every member of the church to render assistance to his immigrating brethren.

The following figures show the immigration to Utah during the time the company was in active operation and they indicate the success of the scheme:[1]

Year	Immigration	Year	Immigration
1849	2,078	1868	3,232
1850	1,612	1869	2,300
1851	1,370	1870	917
1852	760	1871	1,500
1853	2,636	1872	1,631
1854	3,667	1873	2,536
1855	4,294	1874	2,006
1856	3,533	1875	1,523
1857	2,181	1876	1,184
1858	none	1877	1,532
1859–60	2,433	1878	1,864
1861–62	5,556	1879	1,514
1863	3,646	1880	1,780
1864	2,697	1881	2,293
1865	1,301	1882	1,775
1866	3,335	1883	2,460
1867	660		

The company not only paid the immigration expenses and conveyed the Saints across the plains, but it gave them opportunity for employment and directed them in establishing homes when they arrived. The names of the immigrants were sent to Salt Lake City in advance and posted in public places. Friends of the immigrating Saints were also notified in order that they might meet them and take them to their homes. Those who were not otherwise cared for were furnished employment in public shops maintained by the church in the Temple Block. Others who had had experience in forming colonies and who were financially able were sent out under the supervision of a practical pioneer to colonize a new valley which had previously been explored.

---

[1] Marcus Jones, United States Treasury Expert, Utah. *Utah* (a pamphlet published in 1890).

The instruction of Brigham Young to one of these companies of newly arrived immigrants makes clear his spirit and method in dealing with the thousands who were thus brought into his domain. The quotation also illustrates the contrast between his practical and direct method of instruction and Joseph Smith's divine revelations.

> ". . . . With regard to your obtaining habitations to shelter you in the coming winter, all of you will be able to obtain work and by your industry you can make yourselves tolerably comfortable in this respect before winter sets in. All the improvements you see around you have been made in the short space of four years; four years ago today, there was not a rod of fence to be seen, nor a house, except the old fort, as we called it, though it was then new. All this that you see has been accomplished by the industry of the people, and a great deal more that you do not see, for our settlements extend two hundred and fifty miles south and almost one hundred miles north.
>
> "We shall want some of the brethren to repair to some of the settlements, such as mechanics and farmers; no doubt they can provide themselves with teams, etc., to bear them to their destinations. Those who have acquaintances there will be able to obtain dwellings until they can make accommodations of their own.
>
> "Again with regard to labor; don't imagine unto yourselves that you are going to get rich at once by it. As for the poor there are none here; and neither are there any who may be called rich; but all obtain the essential comforts of life. Let not your eyes be greedy. When I met you this afternoon I felt to say 'this is the company that I belong to, the poor company' as it is called and I always expect to belong to it, until I am crowned with eternal riches in the Celestial Kingdom. In this world I possess nothing only what the Lord has given me, and it is devoted to the building of this Kingdom.
>
> "Do not any of you suffer the thought to enter your minds that you must go to the gold mines in search for riches. That is no place for the Saints. Some have gone there and returned. They keep coming and going, but their garments are spotted almost universally. It is scarcely possible for a man to go there and come back to his place with his garments pure. Don't any of you imagine to yourselves that you can go to the gold mines and get anything to help yourselves with. You must live here, this is the gathering place for the Saints."[1]

But no less important than the immigration of converts as a factor tending to increase the Mormon population and thus hasten colonization was the strong emphasis upon early marriage and polygamy. The origin of the Mormon marriage system and polygamy as the cause of conflict is treated in a following chapter; it is intended here to merely call attention to this system as a factor tending to increase the birth-rate in the

---

[1] Address of Brigham Young, *Desert News*, Vol. II (1852).

Mormon community. It is a basic principle in Mormon religion that every matured man and woman in Zion should marry and raise a large family. Bachelors were, therefore, uncommon in early days in Utah and by no means popular. And under the polygamous régime women of the class stigmatized "old maids" were also few. Women entertained suitors from among both the married and the unmarried men and usually made their choice early in life. A few men in that system had as many as twenty-five or fifty children and women ten or twelve children. The following, published in a Mormon journal in 1873, illustrates the situation as well as the attitude at that time toward the subject:

> At the close of a two days' meeting held at Springville a gentleman came forward and presented a specimen of the practical results of one branch of co-operation very peculiar in Utah, though rather unpopular in some of the eastern states. This was a fine, straight, four-year-old boy, which the father stated was the tenth child of its mother and forty-fourth born to him since he was forty years old. Such co-operation as that is hard to beat, and is worthy the imitation of good men and women everywhere.[1]

The problem of colonization was thus attacked in a masterly way. The problem of making the arid land produce food was courageously met and solved about as quickly as it was presented. The solution of the most immediate problem stimulated the colonization spirit until nearly every fertile valley in the great Rocky Mountain region supported a small colony of Mormon people. These colonies grew rapidly. The constant stream of immigrants coming in from the east and distributed among the colonies and, on the other hand, the large families were now demonstrating the efficiency of the entire system.

Having thus before us the facts of the operation and efficiency of the Mormon colonization system, what is the explanation? Was it the result of a great genius? Was it a plan carefully thought out by Brigham Young and his associates or was it a sort of chance achievement? Did one man's mind work it out or was it the accomplishment of an entire community of minds?

Our functional point of view will not permit us to regard this as a plan worked out in advance either by one man or by the entire group. The plan was developed in the process of the adjustment itself. Men do not in real life first think and then act; but they act and think at the same time. The Mormons were thrown into the new situation and really had no time to construct plans and formulate aims. The plans were complete and their aim mentally worked out only when the actual work of pioneering was in process. They later had the plans in the form of institutions which in many respects were only hindrances to further progress. The mental equipment as well as the institutions which the pioneers had for use in organizing their new life was the accumulation from the first great struggle. The process of adaptation was that of making this old subjective material meet the new objective situation.

---

[1] *Millenial Star*, XXXV, 430.

There were some things, however, which had their origin in the first period of Mormon history which did carry over intact into the second period and functioned in the adjustment. There was the strong group sentiment which held the individuals together. There was also the old ideal of building up an independent [illegible] which gave direction to the activities and at the same time served [illegible] great motive force. It is doubtful whether the great immigration scheme could have been carried out had not this old ideal played an important part. The tithing system which had its origin in the early period also carried over into the new life and functioned as a means of aiding the poor members of the group until they were able to care for themselves.

But the old institutions of the Mormon group at the beginning of their big undertaking were not entirely adequate to the new situation. They were inadequate for such relatively quick and efficient adaptation of the group to the new situation. Only in a very general way do these things serve as material out of which a plan could be formed. Brigham Young and his associates needed direct experience with the new conditions and out of the experience itself developed the plans for direction.

The one condition which, perhaps more than all others, brought about quick and efficient adjustment was that of concentrated attention. The crisis itself brought about a focusing of the attention upon the problem of making a living. This was the essential condition for unified action and successful co-operation. Not one mind but many thousands of minds were active and alert in the presence of the new situation.

There is a tendency to regard the colonization scheme as Brigham Young's plan. This was not the case; the latter was inspired by his group just as much as was his predecessor. He saw visions and uttered predictions just as did Joseph Smith, and they came as did those of the latter from the powerful inspiration of the group. Brigham Young was not the impulsive and emotional type of leader that we find in Joseph Smith. But it does not therefore follow that he was independent of the group. The only real distinction here is that the Great Pioneer responded to a different set of group stimuli. The first Mormon prophet responded to the emotional excitement of his people; the second prophet responded to the practical attitude of his people toward their immediate problem. Nor does the distinction lie altogether in the fact that each man was sensitive to his own peculiar stimuli. The group when in the Rocky Mountains furnished to their leader stimuli entirely different from those which they presented to Joseph Smith. To make this more obvious compare the stimuli which the people of Nauvoo furnished their prophet upon the occasion of his return from trial before his enemies with that furnished Brigham Young by the poor immigrants who came into Salt Lake Valley. This comparison can be made by observing the quotation in this and in the fourth chapter. In each case we may observe that the words were only reflections of the attitude of the group itself. These principles are illustrated in the following chapter.

CHAPTER VII

INDUSTRIAL AND COMMERCIAL CO-OPERATION—THE UNITED ORDER

During a period of nearly twenty-four years (1846–70), from the time they left Nauvoo until the Union Pacific Railroad reached their country, the pioneers were engaged in a desperate struggle with nature. We have observed how effectively the Saints met the problems of their primitive environment through irrigation and carefully organized co-operative colonization enterprises. The present and following chapters will explain further this concerted effort of the Mormons to firmly establish themselves in an independent kingdom. During these many years they had lived in peace with the outside social world. Their isolations had proved to be a safe protection against any serious gentile invasion. But just as the Mormons were beginning to realize a mastery over nature the old enemies put in their appearance in other forms. The rapid extension of the railroad westward gave the Eastern manufacturers an opportunity to send their goods into a new field. Brigham Young and his associates, though they regarded with favor the approach of the railroad, were not unmindful of the new problem which it would present. They realized the advantages that such communication with the outside world would bring; a long period of isolation had made that matter clear. The pioneers knew what it meant to transport large machinery across the plains by ox team and the weeks and months of time it took to bring a company of immigrants to the Valley. But while Brigham Young was conscious of all the advantages which a transcontinental road would bring, he could see also the danger of his people becoming dependent upon the outside business life, thus weakening the independent community life already so well established.

The great Mormon leader was determined to meet the new situation in such a way that the advantages would be enjoyed and the evils avoided. He proposed two great co-operative movements, one for production and another for the distribution of the goods thus produced. The large machines for manufacturing could now be imported by rail. These could be installed in the local communities and operated co-operatively. The articles thus manufactured could be bought by a home co-operative mercantile institution and sold to the people. This home production and exchange should hold absolute monopoly in the local market and thus close the door to the gentile manufacturers and merchants. Let us observe how the scheme operated.

Before this particular co-operative manufacturing movement was undertaken by the church the greater part of the clothing was manufactured in the home. The Mormons lived, in a very real way, in what economists call the household stage of industry. Knitting, spinning, and weaving were going on in nearly every wagon during the entire journey across the plains and continued for many years after the pioneers were established in the valleys. It was practically impossible to buy clothes, and it became necessary to make them in this primitive way or dress in the skins of animals, as many did. Sometimes the hair of wild animals was taken from the hides, made into thread, and woven by hand into cloth. It was the task of the women to make the clothes worn by the family.

The household manufacturing was an extremely slow process which by no means met the demand of a people accustomed to better things. Many of the Mormons came from the manufacturing districts of England and had made and worn better clothing. But what were they to do without the machinery to which they had, through many years, grown accustomed? It was these people who felt most keenly the need of improving conditions and, as the psychologist would state it, experienced a felt need for adjustment, a condition which usually precedes invention. These people, many of whom were iron and wood workers, soon began to create simple machinery for use in supplying some of their necessities. A few small and very necessary pieces of machinery were also brought in from the East by ox teams. At first the houses were built from logs and the lumber for the door and window frames was cut with whip saws and held in place by wooden pegs. But soon the blacksmiths began to hammer out nails. Later sawmills and gristmills were established to serve the larger communities or a group of small communities.

But manufacturing in Utah did not become general until at least three years after the advent of the railroad. The real manufacturing boom came when apparently least favored by economic conditions. It would seem that the time for home-manufacturing was when the Territory was free from eastern competition. But on the other hand it was the railroad which made possible the bringing of larger machinery into the Valley, the condition essential for co-operative home industry.

This was the opportune time to preach the gospel of the United Order, and for nearly five years this system was urged upon the people.

in opposition to the interest of the people. Prices had been higher than was thought necessary. This was not at all in accord with the Mormon economic ideal that the welfare of the whole people should always take preference over the interest of the individual. Brigham Young was determined that his people rather than the gentile merchants should enjoy the benefits of the new conditions.

The Mormon church was thus in 1868–69 brought face to face with a most vital commercial problem. It was a question of subduing or being subdued.

> The issue was, Should the church "hold her temporal power or lose it?"[1] Should the gentile money agencies be permitted to exact tribute from the "Chosen People"? As early as 1868, Brigham Young recognized the approaching problem and began to take steps toward the organization of a co-operative system which he intended should completely monopolize all the mercantile business in the Territory. A year later his scheme was completed and there was put in operation a most comprehensive mercantile system entitled Zion's Co-operative Mercantile Institution.

The name of the organization suggests its nature and purpose. It was Zion's institution and was sharply distinguished from private institutions which were of Babylon. In front of every store under the system was the characteristic inscription "Holiness to the Lord." Thus like the United Order it was divine in character. So sacred were these co-operative organizations that those who were directly identified with them entered into a "covenant by re-baptism to be subject to the priesthood in temporal as well as spiritual things. . . . ." In fact all the stockholders of this concern were to be tithe payers.

Besides the large store established in Salt Lake City called the parent institution, there were small branch stores located in all Mormon communities. Besides handling the commodities produced in the local settlement, these small stores would buy eastern goods through the parent institution and sell them to the people. Nearly every man in the local community owned stock in the "Co-op" and consequently, besides feeling a religious obligation to support it, found it to his advantage to do so. And for a few years this institution held a complete monopoly of mercantile business in the small communities.

But in addition to serving as a distributing agent of the home-manufactured goods, the Mormons claim for the co-operative mercantile system three economic results: it lowered the price generally of merchandise, it created and maintained uniform prices, and it distributed the earnings to the people. In 1873, Mr. Clawson, the manager of the parent institution estimated that during the first four years of its existence it had saved the people $3,000,000. In 1889, when the institution had had a twenty years' history, we read the following in a Utah magazine:

---

[1] *Tullidge's Quarterly Magazine*, I, 363.

> In the twenty years since co-operation had been established in Utah, its influence for good has been recognized in every part of the Territory. Not only in the distribution of profits among its numerous stockholders have co-operative stores been a benefit, but the public at large have shared in the profits, as the old practice of dealing, which promoted trade to increase the price of an article because of scarcity, was abandoned. People had no longer to pay a dollar a pound for sugar, and equally exorbitant prices for other necessaries and commodities. Goods have been sold at something like uniform rates, at reasonable profits throughout the Territory.[1]

But after ten years the small co-operative stores were not succeeding as well as the parent institution. Many of them had ceased to be co-operative. And while they continued to carry the name and the inscription "Holiness to the Lord," in the minds of many people they were not so "Holy" as they were intended to be. A few successful business men had purchased the stock of those not interested and soon the majority of the stock was owned by a very few, who at the same time enjoyed the monopoly by virtue of its being a church institution. People were beginning to complain and to criticize the system and even the parent institution. This complaint became so general that John Taylor, then president of the church, found it necessary to rebuke the critics. This rebuke is significant, indicating as it does the relation of the church and the priesthood to the system.

> ". . . . I would make a statement to the Co-op. I have had reports from the North, that some parties who ought to know better had said that the Co-op was no longer a church institution and that it was managed, directed, and controlled by a few monopolists and their operations, which I consider very infamous talk, and especially coming from men who profess to be men of honor. The church, I will here say, holds an interest to the amount of $360,000 and then there are 580 stockholders who are Latter-Day Saints in it, besides the interest which the church holds. And when men make such statements, I consider it infamous and contrary to correct principles, and I should recommend their bishops and the authorities of the church where they live to bring them up for standing and treat them accordingly. That enterprise was started, as was properly implied by the initials of its name. What is it? "Zion's Co-operative Mercantile Institution."[2]

The parent institution has continued to operate but with both Mormon and gentile stockholders. It is no longer regarded as a church institution since Mormons and Gentiles alike are interested. The payment of tithing is no longer required of the stockholders. While the president of the church is at the head of the institution it can hardly be said to be controlled by the priesthood as such. There are about seven hundred shareholders. The Mormon church is interested but it is not the largest stockholder. More than 25 per cent of the stock is owned by non-Mormons. In 1917 the capital stock was increased from $1,077,000 to $6,000,000 and a conservative estimate of the value of its assets places it above $5,000,000 with liabilities of a little more than $1,000,000 making it the largest mercantile institution in the inter-mountain region.

---

[1] *Parry's Monthly Magazine*, IV, 195.

[2] *Report of the Fifth Annual Conference*, p. 74.

From 1880 to 1890 is the declining period of all the Mormon co-operative enterprises: colonization projects had been greatly reduced, the many co-operative manufacturing institutions had given way to large private corporations, and the co-operative mercantile system surrendered to the competitive system in which Mormons and Gentiles alike are actively engaged. But though the enterprises themselves have all come to an end their influence remained and is significant. The co-operative agricultural and colonization enterprises were the very means of human existence while the Mormons were engaged in a life and death struggle with nature and all of the co-operative economic enterprises have had important psychological effects. The Mormon group consciousness was influenced as much by this community struggle with economic problems as it was by the struggle with the common human enemies of the Middle West.

The second stage in the life-history of the group thus comes to a close with certain definite results. These results need not be considered here since they are fully treated in the third part of our discussion. But we may observe at this point that it was during this period of Mormon history that most of its institutions took definite form. It was here that the priesthood received its claim to the guidance in all the activities of the people. It was here that the purpose and function of the bishop was most fully realized. He became not only the spiritual advisor, but the captain of the colonizing company and the chief judge and arbitrator among the people. It was here that the prophet was made governor and received his political authority. It was here that the tithing system became permanently established and the church began its business activities. It was in this isolated situation that polygamy was first practiced to any extent and all the Mormon theology connected with family life and eternal progression received a lasting place in its system of philosophy. All these institutions were passed on to the next period and are the sources of the third great conflict to which we shall now turn our attention.

PART III

MALADJUSTMENT BETWEEN NEW THOUGHT AND OLD INSTITUTIONS

CHAPTER VIII

THE INNOVATION OF SCIENCE AND DEMOCRACY

On a psychological basis we may distinguish four Mormon generations. The first generation lived in a period of activity and excitement, of strife and stress. It experienced strong emotions and spiritual manifestations. The second generation lived on the sentiments and traditions created by the first. It too experienced strong group feelings which grew out of the thoughts and influence of the past. Like the first, this class was unreflective, but lived in a world of sentiment. Then comes, thirdly, a generation of philosophers or theologians who take an intellectual attitude toward Mormonism but whose group sentiments are still strong enough to determine their thinking. They have a feeling that Mormonism must be right and they set themselves the task to prove it. Theirs is a sort of rationalism similar to that of the Middle Ages. And finally we have a generation of critics and scientists who seem to sense very little feeling of obligation toward the group but are placing the institutions of their fathers on the dissecting table for analysis. This class is making a demand for greater freedom of thought and discussion and it is this demand which is bringing about a third Mormon crisis. Nearly all of the Mormons of the first generation have passed away but the second and third generations are still strong and it is these two classes on the one hand and the critics on the other that are bringing about the present-day conflict, the maladjustment to which we shall now turn our attention.

The individuals in our present society may come in contact with each other in four important relations, educational, economic, political, and family. If there is lack of harmony in a community it will usually make itself manifest in one or in all of these ways. Within the Mormon community at the present time a conflict is clearly manifest in each of the four relations. In the present and the following chapter we shall discuss this internal Mormon strife.

When the Mormon people had fairly mastered their primitive environment and were well established in their mountain homes this new problem arose. We may regard their first two great problems as external in character, a struggle with another group and with nature. The present is an internal problem. And whereas the preceding conflicts tended toward greater group solidarity, the present is destructive to group life.

When the outward pressure was removed and the community had created an economic surplus, thus giving to some of its members leisure and opportunity for study, individual thought, criticism, and skepticism were given birth. So long as the people were at war with nature and with another society there was no time for personal reflection. So long as the people were engaged with a common enemy the individuals were easily controlled by the authority of the priesthood but when the outer problems failed to demand the attenton of the individuals they began to look into their own institutional life.

The new spirit began to manifest itself in 1869 and 1870, in what was known as the "Godbeite movement." Three young Mormon elders, William S. Godbe, L. T. Harrison, and Edward W. Tullidge, men of ability and education, began the publication of the *Utah Magazine.* They were the first to make literature a profession in Utah. They found, however, that purely literary work in Utah at that time was premature. They consequently devoted a portion of their time to the discussion of what they thought were vital social questions.

In Brigham Young's great co-operative scheme he not only thought it necessary to regulate the prices of the manufactured articles but believed it desirable to determine the wages of labor. He called a meeting of his ecclesiastical associates and it was agreed to reduce the wages generally and to fix the wages for the different classes. The unskilled laborers were to have one dollar a day and the mechanics were to receive one dollar and a half a day. As may be expected the working men began to murmur and to discuss the question of organizing into trade unions. The *Utah Magazine* took up the cause of labor and published an article entitled "Our Working Men's Wages." It was an attack upon the prophet and his social policies, and a dangerous thing because it dared question the wisdom of the "Lord's anointed." Next came an article headed "Steadying the Ark," whose first paragraph illustrated the new point of view and at the same time showed the actual situation as it was then manifesting itself.

> There are a few people in our territory, who, whenever an independent idea is expressed on any philosophical or theological subject, immediately call out, alarmed, that the speaker or writer in question is "steadying the ark," meaning thereby that such person is trying to dictate to the church. As if—whether the speaker's intention was so or not—the action of independent thought could by any possibility be dangerous to an imperishable system like ours. It is a fear of having something of this kind said about them that has deterred many a person from expressing conceptions of the truth of which they were assured

but which did not happen to tally with popular opinion. The existence of such a fear dwarfs and stunts the intellect as well as the spiritual growth of men; and being contrary to Mormonism which was offered to all as the gospel of free thought and free speech, too, should be broken down.[1]

The journalists next attacked Brigham Young's policy in the industrial development of the Territory. The latter had from the first opposed the opening of the mines. The wisdom of this position cannot well be doubted. To have permitted his people to undertake this industry might have resulted in starvation and would have at least put an end to Mormonism. It is now generally conceded that Brigham Young's agricultural policy is largely responsible for Utah's present prosperity. Had the mining motives been unchecked, that industry would no doubt have been more highly developed than it now is, but the great agricultural resources would have been undeveloped and the state would be unable to support more than one-half or one-third its present population.

But there were many at this period who were anxious to enter this speculative industry and were waiting only for the church to change its attitude. The writers insisted that mining was the industry for which the territory was well adapted and that that alone promised a vast surplus. The people were carrying on business largely by barter and it was argued that what the community needed was money, and that the best way to obtain it was by digging it out of the ground. Whether so intended or not the publication of these articles was regarded as the inauguration of a rebellion against the priesthood. Such liberty could not be permitted. The writers were brought before the High Council for a hearing. The following question was put to the young critics by this ecclesiastical tribunal: "Do you believe that President Young has the right to dictate to you, in all things temporal and spiritual? The reply came that they did not believe that the president had such right but that the

> light of God in each individual soul was the proper guide and not the intelligence of one human mind. According to the Prophet and his Apostles this was sufficient cause for excommunication and action was consequently taken. The young men inquired whether or not it was possible for them to honestly differ from the presiding priesthood, and were told that such a thing was impossible, and that they might as well ask whether we could honestly differ from the Almighty.[2]

Whether due to the controlling influence of the leaders of the church or to some other cause the question of the independent thinking and freedom of discussion within the church did not become again a disturbing question for a number of years.

---

[1] *Tullidge's Quarterly Magazine*, I, 22.

[2] *Ibid.*, I, 32.

Some of the more intellectual leaders of the church had written books on Mormon doctrines but the spirit of these had all been to justify the prevailing point of view rather than to analyze the institutions for the purpose of getting at the truth. Of course there had been men not connected with the church who had taught "heresy" to the youth of Zion ever since the time the church was organized. Men connected with the larger state educational institutions had modestly expressed their opinion on what they regarded to be the "delicate subjects." But these critics were all non-Mormon and the prejudice against those of the other group had always been so strong among the Mormons that very little notice was taken of the criticism. Should any of the youth manifest sympathy toward the new interpretation there were always enough orthodox Mormon preachers and educators to counteract the unorthodox tendency.

But about 1907 a number of young men of Mormon parentage returned from eastern educational institutions, where they had received higher degrees. The study of science, philosophy, sociology, and the higher criticism of the Bible had given them a new point of view. Yet they were regarded as Mormon boys of good character and were employed to teach in the high schools and colleges of the church, the system from which they had been graduated a few years previously. They were also placed in positions of responsibility on other Mormon organizations, intended for religious education. But they were not long to enjoy such confidence. Their frank expressions of opinion on such subjects as the origin of man, the visions and revelations of Joseph Smith, the literal interpretation of the Bible, and other subjects in which the orthodox interpretation had been definitely established soon brought about controversy. The young people under their instruction were quick to detect disagreements between the interpretation which their parents had placed upon these things and that which was now made by their professors. The students were mentally disturbed but were by no means antagonistic toward the new doctrine. It had come, not from gentile teachers, but from their brethren in the church. The new doctrine was carried home to the parents who were much less inclined to view with sympathy the instruction which their children were receiving.

There are many reasons why it is extremely difficult for the Mormon doctrines to be harmonized with the new scientific and democratic conceptions. The more basic doctrines of Mormonism center around such questions as the creation of man, the literal interpretation of the Bible, the authority of the priesthood, the divine and eternal nature of Mormon institutions, God's commandments as absolute moral laws, and revelation through the prophet as the only source of all religious truth. All these questions create friction between the present educational spirit and Mormon orthodoxy.

Should Mormonism accept the evolutionary point of view some of its most sacred doctrinal principles would have to be abandoned. All the rituals and dogma which have grown up about Adam and his mission on earth and the commandment given him to multiply and replenish the earth would become meaningless. The story of the Book of Genesis as well as that of the Mormons' own sacred book, the *Pearl of Great Price*, would become mere fiction. And to regard the latter as fiction would be to deny one of the foundation stones of Mormonism. Furthermore, for the Mormons to accept the evolutionary doctrine of the origin of man would be to deprive themselves of their best argument in support of their conception of God. They maintain that God is like a man except that he is perfect. They prove this by the Scripture which says that God created man in the likeness of his own image. Thus to accept as truth the evolutionary theory requires the sacrifice of the basic principle of Mormon doctrine.

Nor can the orthodox Mormons easily accept the teachings of higher criticism. As already observed one of the demands which brought Mormonism into existence was a desire for a more literal interpretaton of the Bible. A great many of its institutions and points of doctrine were taken from the Old and New Testaments. That means of course that they cannot give up the seventh article of their faith which reads: "We believe in the gift of tongues, prophecy, revelation, visions, healing, and interpretation of tongues, etc." To deny that these things took place in ancient Israel and in the days of Christ and still believe the Bible to be the book of God is, to them, an impossibility.

Again the sixth article of their faith reads: "We believe in the same organization that existed in the primitive church, viz: apostles, prophets, pastors, teachers, evangelists, etc." In other words this form of organization is eternal and cannot be changed by the "whimsical notions of men." The divine authority of the priesthood is a very distinctive characteristic of Mormon control. The fifth article of faith is even stronger: "We believe that a man must be called of God by prophecy and by the laying on of hands by those who are in authority to preach the Gospel and administer in the ordinances thereof." All knowledge for the guidance of the church, all interpretation of religious doctrine, all authority to preach and teach the gospel, all commandments from God, must pass through one channel, the prophet or president of the church.[1]

Between this attitude on the part of the more conservative members of the church toward their institutions and the authority of the priesthood on the one hand, and on the other hand the attitude of the social scientists who regard all social institutions in the process of change and who recognize no authoritative control above that of the people, and who find human experience to be the only source of knowledge, there is, obviously, slight opportunity for compromise.

And so it was in the case of the three university professors and the committees representing the general authorities of the church. It was impossible for them to come to an agreement which would make it possible for the young men to retain their positions and at the same time continue to teach what they regarded to be scientific truth! The following account of the investigation is taken from the *Provo Post*, a paper published in the community in which the controversy took place.

> An extended investigation was held, at which the utmost freedom and cordiality was extended to the professors, each explaining his attitude with perfect frankness and candor.
>
> As a result of this examination and investigation the committee mentioned above found that the statements of Superintendent Cummings were substanti-

---

[1] President Charles W. Penrose attempts to reconcile the demand for freedom of thought with the requirement that the revelations of the Mormon prophet be considered absolute:

"We don't want to prevent men from thinking. I have heard some of my brethren say, 'Well, do you want to stop men from thinking?' Not at all. Liberty to think and liberty to act upon the thought if you don't infringe the rights of others. Liberty to think, brethren, liberty to read, liberty to have theories and notions and ideas; but, my brethren, it isn't your province nor mine to introduce theories into the church that are not in accordance with the revelations that have been given· Don't forget that. And if any change in policy is to be introduced, it is to come through the proper channel. The Lord said only his servant Joseph should do that while he lived, and then after he died others were to be called to occupy the place, and the key is in the hands of the man who stands at the head, if any change is to be introduced in our church. Don't let us fix our minds too much on the ideas and notions that are called science. If it is really science that they produce, something demonstrated, something proved to be true, that is all right, and there is not a doctrine of our church that I can find that comes in direct conflict or contradiction to the sciences of the times if they are sciences, but a great deal of that which is called science is only philosophy, and much of it speculative philosophy, and these ideas change with the ages, as we can see by reference to what has been called science in times that are past."—Charles W. Penrose, *Eighty-eighth Annual Conference*, pp. 21–22.

ated, and they recommended to the board of trustees of the Brigham Young University, which held its session today in the office of the president of the church, that these professors be required to refrain from teaching doctrines that have not received the approval of the church.

At this meeting of the board it was unanimously resolved that no doctrines should be taught in the Brigham Young University not in harmony with the revealed word of God as interpreted and construed by the presidency and apostles of the church, and that the power and authority of determining whether any professor or other instructor of the institution is out of harmony with the doctrines and attitude of the church was delegated to the presidency of the university.[1]

This action of the general authorities of the church had important results. On the one hand it aroused curiosity and stimulated thought in the minds of many of the young people of the church. They were anxious to know all about those things which the entire priesthood had become so concerned about. On the other hand the treatment which the young professors had received had made it clear to them that these things must not be taught or discussed in the church schools. This resulted in a search for information from those who had little regard for the sacredness of religious institutions. It had also the unfortunate effect of stimulating hypocrisy among young college men and women. Young teachers hesitated to express themselves on important matters of scientific and sociological value for fear of losing their positions and receiving the boycott of the church.

But notwithstanding those facts, the educational institutions, both church and state schools, are the great reconstructive forces in the Mormon community. They are injecting into the minds of the young people of the state knowledge of present social and scientific thought which is having its influence in widening their horizon. The young people are beginning to feel a power within themselves to discover truth, to analyze and evaluate principles of doctrine. They are taught the importance of democracy and the advantages of placing in the hands of the people the right to make and change social institutions as conditions demand.

[1] *Provo Post*, February 21, 1911. The three professors resigned their position at the Brigham Young University and two of them have since left the state.

CHAPTER IX

THE CHURCH AND BUSINESS

"Institutions," says Veblen, "are products of the past process, are adapted to past circumstances, and are therefore never in full accord with the requirements of the present."[1] The institutions in the Mormon church known as the temporal organizations came into existence when the material interests of the members were largely under the control of the priesthood. But for psychological reasons institutions once created cannot easily be eliminated from social life. The fact that they came into existence and met a community need has made them seem vital. The tithing system as well as business and industrial institutions came into being and developed as results of the Mormon effort to meet material needs. The needs were met but the institutions still remain, causing a maladjustment similar to that between Mormon dogma and science—a conflict between old institutions and present demands.

In pioneer days economic life and the spiritual life of the Mormon community demanded a strong centralized control. The people could not have survived the early persecutions had it not been for the ability of the church to help those who were reduced to extreme proverty. The tithing system and the contributions were found very helpful also in the great colonizing project of Brigham Young. In regard to the financial affairs of the Mormon church three criticisms are now common: (1) that the tithing system is inequitable; (2) that the revenues of the church are controlled by a few of its leaders; (3) that the pecuniary interests rather than the social welfare of the people have become the controlling factor in the distribution of its income.

1. Dr. George H. Brimhall, former president of the Brigham Young University, presents the argument for tithing which is typical among those in the church who feel it their sacred duty to justify all the institutions of Mormonism. He says:

> Tithe-paying is the most equitable and natural distribution for public support. Behind it stands the principle enunciated by the Lord Jesus Christ, that "to whomsoever much is given, of him much shall be required." Tithing is an income tax divinely assessed and paid as a free-will offering.[2]

---

[1] *The Theory of the Leisure Class*, pp. 191 f.

[2] *Tithing* (a pamphlet), p. 5.

This argument does not appeal to the critic who cannot call an income tax equitable which taxes the poor man, whose annual income, let us say, is $1,000, at the same rate that it does the rich man whose annual income is $10,000. The most basic ethical principle of taxation, namely, that the rate should be in proportion to an individual's ability to pay taxes, is here violated. The man with an income of $1,000 who pays $50 in tithing may be depriving his family of some of the necessities of life, whereas the man who pays $1,000 out of his $10,000 income, makes no such sacrifice. His family will still have sufficient food, proper clothing, and shelter. Later the church engaged itself in promoting certain business enterprises which were considered necessary in the community. The machinery for the maintenance of such enterprises thus came into being and has remained until the present time.

The Mormon people are now well established in their mountain homes. Persecution and extreme poverty no longer threaten them. There is also enough private capital in the state or within easy reach to promote any new business enterprise that the future social need may require. The church does not now make a practice of paying the expenses of immigrating the Saints or of feeding them when they arrive. In fact few of the old economic problems now remain and yet the old system still remains and with an increased revenue.

The late President Joseph F. Smith informed us that the "entire tithing of the church in all the world for the year 1914 was $1,887,920. In 1917 the tithing dispersements totaled $2,169,489."[1] Besides the tithing, according to President Smith "enough is received from investments to pay the expenses of the General Authorities and the maintenance of the office of the First Presidency." The amount of the tithing annually received by the church was not made public until very recent years. But owing to the pressure from curious people, whose imagination magnified the amount of tithing received by the church, President Smith gave the information. He says:

> I am taking the liberty that has not been indulged in very much but there have been so many false charges made against me and against my brethren by ignorant and evilly disposed people, that I propose to make a true statement which will, I believe, at least have a tendency to convince you that we are trying to do our duty the best we know how.[2]

Although tithing is a free-will offering, the failure to meet this obligation is thought to bring serious consequences to a church member. To the non-tithe-payer, "the doors of the Temple are closed and the privileges of sacred ordinances cut off."[1] He is considered unfit to partake of the sacrament, for "He that eateth and drinketh unworthily, eateth and drinketh damnation to himself." And finally "Apostasy is the inevitable end of persistent non-tithe-paying." Those who will not obey "the law of tithing shall not be found worthy to abide among the saints." To many of the Mormon people these consequences are more terrible than the consequences which may follow the neglect of other financial obligations. In fact many do, as President Brimhall claims that they should, give first consideration to this obligation.

---

[1] *Eighty-fifth and Eighty-eighth Annual Conference Reports.*

[2] Joseph F. Smith, *Eighty-fifth Annual Conference Report*, pp. 129–40.

2. But the power that is exercised by the authorities in the control of the church revenues is more important than is the question of the injustice of tithing. To sacrifice rights in a democratic society is more serious than it is to suffer the wrongs which a system may impose. Where a few individuals have complete control of the large and increasing church revenues, and where these individuals obtain their positions by revelation rather than by the election of the people and where removal from office cannot be accomplished through the people's own initiative, we have a situation entirely out of accord with the social and ethical thought of the times. The late President Smith was conscious of the criticism and justified the position of the church as follows:

> The Lord has revealed how this means shall be cared for, and managed; namely by the Presidency of the Church and the High Council of the Church (that is the Twelve Apostles) and the Presiding Bishopric of the Church. I think there is wisdom in this. It is not left for one man to dispose of it, or to handle it alone, not by any means. It devolves upon at least eighteen men, men of wisdom, of faith, of ability, as these eighteen men are. I say it devolves upon them to dispose of the tithes of the people and to use them for whatever purpose in their judgment and wisdom will accomplish the most good for the Church; and because this fund of tithing is disposed of by the men whom the Lord has designated as having authority to do it, for the necessities and benefit of the Church, they call it commercialism.[2]

The very arguments that he presented to justify the system are the very ones that the critic uses to condemn it. To say that this method of financial control was revealed by the Lord is to admit that it did not originate from the people; and to say that the eighteen men were designated by the Lord as having authority to dispose of the tithing again means that this authority was not given them by the people. The very fact that these men claim the divine right to the control of the wealth of the church makes the situation even less democratic.

---

[1] George H. Brimhall, *Tithing* (a pamphlet), p. 4.

[2] *Eighty-second Annual Conference Report*, p. 6.

But the older members of the church, however, do not raise any question regarding the right of the priesthood in this respect. It is entirely in accord with the traditional Mormon notions that the prophet of God has the right to direct in all matters, temporal as well as spiritual. And then again, while this method is not in accord with the social and ethical thought of the times, it is entirely in accord with the everyday practical economic relations. In business and industrial life, absolute control is in the hands of the relatively few; the great majority of the people have no voice in such matters. It should also be observed that, excepting those who have come in contact with the new social and ethical spirit, the Mormon people are not inclined to favor innovations of any kind. The great majority are rural people and naturally conservative. There are very few members of the Mormon church who belong to disturbing industrial organizations or labor unions. The church has always opposed the affiliations of its people with organizations not under its own control, and consequently a very few Mormons have become identified with labor movements.

3. What are the social and psychological effects of this system and how are these results brought about? It is with the community as with the individual: when the economic necessities are provided for, what is left over is spent in luxuries. These nonessentials may take many different forms and are relative to the stage of civilization as well as to the interests and values which a community may have developed. A community may have developed a certain class of spiritual values which it deems highly essential but which another community may regard as unimportant, and, considering the effort spent in acquiring them, even a positive waste of time and energy. There is, for example, in the Mormon church considerable time and money spent in constructing and maintaining temples in which hundreds of people are engaged every day performing sacred ordinances "for the living and the dead." Considerable money and energy is spent in maintaining theological seminaries. To the non-Mormon these are real wastes but to the orthodox Mormon they are among the most important activities of the church. From the social point of view these things must be considered as of secondary value, i.e., they are acquired interests which should be satisfied only after the primary needs have been met. And while these activities were carried on to a limited extent in the early history of the church they have

received their greatest prominence during the last twenty years. In the early days of the church the tithing was used for buying land and for building canals and factories and for the immigrating of the Saints. But there is no longer a demand for this type of enterprise and consequently a large part of the tithing is spent in satisfying "spiritual interests."

But this is not to imply that the church is no longer engaged in business activities. The church owns stock in a number of corporations which it helped to establish in early Utah history and which have become very large and prosperous institutions. It has also investments in new enterprises. The motive now, however, is pecuniary rather than social. It invests its money for profit and not because the community is in particular need of the assistance of the church in promoting business interests.

The income from these investments pays the salaries of the general church authorities, who thus naturally become interested in promoting the business from which they receive their income. This explains why some of the apostles become active business men and adopt the business men's point of view.[1] Other high church officials were prominent business men before they received their church appointment and were selected in part because of their business ability. Joseph F. Smith, while president of the church, was president of the Utah-Idaho Sugar Company, of Zion's Co-operative Mercantile Institution, of the State Bank of Utah, of Zion's Savings Bank and Trust Company, of the Consolidated Wagon and Machine Company, of the Inland Crystal Salt Company, of the Beneficial Life Insurance Company, and of other companies which need not be named. This serves to indicate the great variety of his business interests. In some of these neither the president of the church nor the church itself owns very much stock, but the name of the president of the church attached to a business concern gives it prestige among the Mormon people and creates an attitude of confidence toward it. Charles W. Nibley, the presiding bishop of the church, was for many years manager of the Utah-Idaho Sugar Company. He is one of the most successful business men of the state. Heber J. Grant, now president of the church, and Reed Smoot, an apostle and United States Senator, are also active business men, with the business man's point of view. The other members of the quorum of twelve apostles as well as the presidents of stakes are, as a rule, of the business class but are less prominent. Thus the most influential men of the Mormon priesthood are business men and as such place high value upon pecuniary ideals and methods.

---

[1] That the Mormon church has through its leaders become strongly pecuniary is not to imply that social interests are entirely neglected or that the officials are using the church to promote their own financial interests. They are men of moral character and business integrity.

This pecuniary point of view which has developed among the authorities of the church is criticized not only by some of the younger members of the church who find it out of harmony with their growing democratic ideals, but also by the older members of the church, who live in rural districts and have not kept pace with this developing business spirit, holding still to the old co-operative and communistic notion of the pioneers.[1] The latter especially are inclined to question some of the business attitudes of their leaders. For example, Hotel Utah, one of the most magnificent buildings of its kind in the country, was constructed through the efforts of the church and its leaders. Many of the people who come to Salt Lake City only once or twice a year for the purpose of attending the general conferences of the church cannot afford to buy accommodations in Hotel Utah. Coming from rural communities they are naturally conservative and inclined to hold to the traditional notion that the church should promote the interest of Zion and her people. They are unable to understand why the tithing which they paid should go toward the construction of such an institution which only the wealthy Gentiles can enjoy. Also, before prohibition went into effect this hotel maintained a bar. Why should the Saints contribute their means to the erection of a building in which liquor is sold? This criticism became so common that the late President Smith took occasion to refer to it in general conference.

> We have helped to build one of the most magnificent hotels that exists on the continent of America, or in the old continent either. I am told that it is equal to any in the world in its facilities for convenience and comfort for its guests, for sanitation, for its situation, and architectural beauty, and in many other ways. Well, some of our people have thought that we were extravagant. I would like you to turn to the book of *Doctrine and Covenants* and read the commandment of the Lord to the Prophet Joseph Smith in the city of Nauvoo. The people were requested to contribute of their means to take stock in this building, Nauvoo House, and they and their children after them, for generation to generation, should have an inheritance in that building, for it was intended for the beauty of the city, for the glory of the stakes of Zion, and to accommodate the stranger from afar who came to contemplate the doctrine of the church and the work of the Lord. . . . .
>
> Now I hoped and I prayed and I voted and did all I could in the hope that the good people of this city would vote it dry so that we would not be com-

---

[1] Heber Bennion, *Gospel Problems*, p. 36.

> pelled to allow a saloon or bar to be operated in the Hotel Utah. If you had voted it dry we would not have had any bar there. . . . .
>
> But it went wet and therefore the people that visit us want something to wet up with once in a while, and unless it is provided for them they will go somewhere else and instead of beholding and viewing the beauties of Zion they will go where they will see everything that is not beautiful. . . . .[1]

The hotel was thus built, according to President Smith, "for the beauty of Zion, to accommodate the stranger from afar." But the more humble country folk were unable to comprehend the new standard by which Zion is judged or to see in this representation of pecuniary strength a true symbol of Mormonism. They had looked upon the humble elder, traveling without "purse or scrip" and preaching without pecuniary compensation, as a true representation of the gospel. And it was obvious to them that the "stranger from afar" who could afford to visit Hotel Utah and who is attracted to the hotel because of the bar is not the type of man who would be likely to become a member of the church. The class of people who would be impressed by the display of pecuniary power do not "come to contemplate the doctrine of the church."

Thus the business man's standards and point of view is rapidly developing among the leaders. There is a growing tendency to take sides with the capitalist class and with large corporations against the laboring classes. The philosophy of the church leaders was at one time radical and socialistic; it is now conservative and capitalistic.[2] They do not hesitate in their sermons and in the editorial columns of the official papers to denounce socialism and trade unionism as anarchism when those become active in opposing the interests of business corporations. The present economic order is accepted by them as right and proper. In fact their philosophy seems to have completely changed in this respect from that held forty years ago. The United Order is as far from their minds as is socialism from the minds of the owners of large corporations.

---

[1] *Eighty-second Annual Conference Report*, p. 30.

[2] President Smith disapproved the tendency to criticize corporate interests. "Let us please fail," he said, "to find fault with industries which are instituted in our midst for the purpose of giving the people prosperity and advancement . . . . or help to build up Zion. . . ."—*Eighty-second Annual Conference Report*, p. 10.

CHAPTER X

CONFLICTS IN THE MORMON MARRIAGE INSTITUTIONS

No institution or doctrine in the Mormon church is regarded as more important and no ceremony is performed with greater reverence than is the Mormon marriage. It is performed in the most sacred of places and by persons possessing the greatest authority. The covenants and vows made on this occasion are the most binding, and grave spiritual consequences are supposed to follow the breaking of them; on the other hand, the greatest blessing that can come to a young couple is to be married in the temple by proper authority for "time and all eternity." According to the Mormons, proper marriage is the first step that a man takes toward the creation of his eternal kingdom, the highest ideal in the mind of an orthodox Mormon.

There is perhaps no relationship of life which is so universally regarded sacred as that of marriage. From the most primitive tribes, of Africa and Australia, to that of the most cultured people of Europe and America, the marriage ceremony is conducted with some degree of reverence. It is only within relatively recent times and among civilized people that the contract conception of marriage is taking the place of marriage as a sacrament. And in the minds of many sociologists this transition is not always accompanied by moral advancement and social stability. According to Ames, marriage becomes a sacrament in primitive life because of its relation to the reproductive process.

> Among primitive people the gods were the givers of life and of material blessings, including the young of the flocks and the children of the family. The gods were the gods of fertility, of reproduction. All agencies and processes of this reproductive life were sacred. The sexual organs and the sexual acts were sacred, and they were accordingly consecrated by religious ceremonies. The very antagonism which some claim to discover between developed religion and the sexual instinct is due to the fact that religious customs tend to regulate and thereby preserve and idealize the instinct. Any ascetic tendencies in developed religions are more than offset by the scrupulous, sympathetic regard for the reproductive life, which is expressed by making marriage a sacrament, circumcising or christening the infants, conceiving the deity as father and exalting motherhood in worship and art.[1]

---

[1] Ames, *The Psychology of Religious Experiences*, pp. 221–22.

Thus not only do the Mormons consider marriage as sacred, but primitive and civilized peoples everywhere tend to view sex relationship as sacred and to make the religious ideals center around the sex life. What is the explanation? So far as psychology can account for this it lies in the fact of attention. Anything which frequently attracts the attention will little by little receive importance in the scale of values. If a thing receives attention from the entire group, and for many years it takes upon itself an element of mystery which inspires more than ordinary regard, it becomes an object of reverence. In fact out of the sex instinct develop the highest ideals, religious and moral, that the race has attained.

Professor Thomas attaches great importance to the socializing function of the sex instinct:

> This sex-susceptibility, which was originally developed as an accessory of production and had no social meaning whatever, has thus, in the struggle of society to obtain a hold on the individual, become a social factor of great importance, and together with another product of sexual life—the love of offspring—it is, I suspect, the most immediate source of our sympathetic attitudes in general, and an important force in the development of the ideal, moral, and aesthetic side of life.[1]

But besides the powerful instinctive force of sex life to attract the attention of the individual and the social group, attention on sex relationship is also artificially stimulated by ceremonials and formalities that have grown up unconsciously and which now exercise an influence by themselves. The younger individuals in the group are in this way compelled to focus their attention upon that which is made so much of by those around them. They imitate readily; first, the outward expressions are evident, but soon out of the expression a sentiment in accord with their conduct is developed.

The young people frequently hear long discourses on the importance and sacredness of marriage and the blessings of large families. They observe the building of temples and are encouraged to make contributions to their construction. They hear their parents tell of traveling hundreds of miles in order to receive the blessing of marriage in the sacred buildings. Curiosity is awakened by the taboo placed upon the discussion of the sacred rites performed in the temple. All this talk about marriage and preparation for marriage combined with the instinctive interest in sex life have made this relationship the most sacred in the Mormon community.

Before considering the elements of conflict now active in breaking up this sacred and orthodox notion of marriage relationship a brief statement of the origin and history of this, the most basic Mormon institution, is necessary. Like every other institution and doctrine in Mormonism, the traditional element, brought in contact with modern conceptions, has occasioned conflict. A maladjustment existing between the accumulations of the past and the demands of the present has caused contention within the Mormon ranks.

---

[1] *Sex and Society*, p. 120.

The ideal form of marriage, according to orthodox Mormonism, is that which was practiced by the ancient patriarchs of Israel. Abraham, Jacob, Moses, David, and Solomon practiced polygamy, and since the God of Israel approved of their lives, and since he is the same yesterday, today, and forever, why, they argue, should he not sanction polygamy among his favored people in the present age? The orthodox Mormon cannot conceive of God's plan as changeable and relative, it must be universal and absolute. They admit of progress in the human race and they preach eternal progression as the essence of God's universe, but the condition of progress they state in absolute terms. For example, there is no progress outside of the bonds of the "celestial order of marriage." And the degree of progress that is made in eternity depends upon the size of a man's family. Polygamy is, therefore, an important condition of progress and a basic principle in Mormon theology.

But it is not enough that a principle was practiced in ancient Israel; before it can be accepted as a part of Mormon doctrine it must be supported by modern revelation. Thus on July 12, 1843, when Joseph Smith was contemplating the marriage form of ancient Israel, he received the revelation which has so profoundly influenced Mormon life. The following are extracts from the revelation:

> "Verily, thus saith the Lord, unto you, my servant Joseph, that inasmuch as you have inquired of my hand to know and understand wherein I, the Lord, justified my servants Abraham, Isaac, and Jacob; as also Moses, David, and Solomon, my servants, as touching the principles and doctrine of their having many wives and concubines: Behold! and lo, I am the Lord thy God, and will answer thee, as touching this matter.
>
> "Abraham received concubines, and they bare him children, and it was accounted unto him for righteousness, because they were given unto him and he abode in my law; as Isaac also, and Jacob, did none other things than that which they were commanded. David also received many wives and concubines, as also Solomon and Moses, my servant, as also many others of my servants, from the beginning of creation until this time and in nothing did they sin save in those things which they received not of me."[1]

While the Saints were in Nauvoo, polygamy was not publicly preached. Joseph Smith taught it secretly to some of his associates but not until August 29, 1852, was the revelation presented to the church.

---

[1] *Doctrine and Covenants,* Section 132:1, 37.

From that date until 1890 polygamy was taught and practiced in every settlement in the Mormon country.

The Mormon isolation in the West was most favorable for the establishment and growth of polygamy. There were here only two influences directing the lives of the individuals, the thought and institutions of the Mormon church and native human instincts. Both factors favored plural marriage. On the one hand it was encouraged as ancient custom, as a revelation from heaven, and as a means to a great posterity; on the other hand the fickleness of the sex instinct favored it. The only reason, says Professor Thomas, why monogamy is practiced today is because it has become an acquired habit by the race and "not because it has answered more completely to the organic interest of the individual." When the instinct is thus not only set free from social restrictions and conventional influences, but is actually encouraged by the only social institution now influencing the individual, it is not surprising that the members of the group so quickly accepted the new order of marriage.

For a period of thirty years (1852–82) the polygamous institution was permitted to run its course. It was difficult for the United States officers in Utah to handle the situation. The laws were inadequate and the enforcement of the laws was a still greater problem. But in March, 1882, the Edmunds Bill was passed by Congress punishing polygamy by disfranchisement, imprisonment, and by declaring the children of such marriages illegitimate. This law the government officials in Utah were determined to enforce. Hundreds of men were imprisoned and many more driven to hiding in remote places; women and children were left unsupported and unprotected. Many deaths resulted from the hardships they were compelled to undergo. President Wilford Woodruff wrote in his daily journal, while in hiding: "There has never been a time since the organization of this church when such a universal howl was raised against us. The whole land is flooded with lies against the people of God. The government seems determined on the destruction of the faithful Latter-Day Saints."[1] It was at this time that President John Taylor died and his successor, while still in hiding, writes of him: "President John Taylor is twice a martyr. He was shot four times in Carthage jail when Joseph and Hyrum were slain and there he mingled his blood with the martyrs. . . . . Now in 1887, driven into exile by the United States officers in consequence of his religion, he lays down his life for the truth."[2]

In 1890, partly as a result of the vigorous prosecution of the law against polygamists, but mainly because there was a possibility that

---

[1] Cowley, *Life of Wilford Woodruff*, p. 538.

[2] *Ibid.*, p. 560.

Utah might obtain statehood, the president of the church issued the "manifesto" in which he declared officially that the Latter-Day Saints are "to refrain from contracting any marriage forbidden by the laws of the land." This statement is significant because it marks the beginning of a new era in Mormon history. The United States officers ceased to harass the Mormon priesthood and polygamists. Soon Utah received statehood, and peace and good will seemed to be at once established between Mormons and Gentiles. Polygamy did not discontinue as quickly as the government officers and the people of the country had hoped that it would, but the conflict was made to shift from that between the Mormons and Gentiles to a conflict within the church itself.

On the basis of their attitude toward polygamy the Mormon people are divided into four distinct classes: (1) There is a young radical class who believe neither in the principle nor practice of polygamy, and who believe that it should be eliminated from the church in both root and branch. This is the growing attitude among the young men and women of education in the church. (2) There is also another class of Mormons who believe in polygamy but not in its practice at the present time. They interpreted the manifesto to mean that men who had plural wives at the time that it was issued should cease to live with all but one of them. There were a few men in the church who thus broke up their families after the issuing of the manifesto. (3) A third class, and perhaps the great majority of Mormon people, believe in the principle of polygamy and in its practice to the extent of maintaining the marriages solemnized before the manifesto, but they do not believe in contracting plural marriages after the manifesto. This is the attitude that is taken by the present authorities of the church. (4) A fourth class is also found in the church who believe that neither the government nor the church has the right to eliminate an institution divinely established. This is perhaps the most consistent orthodox class. There are a few men in the church who believe that they have the authority to solemnize plural marriages, and consequently a few such marriages have been performed since the issuing of the manifesto. A large percentage of the polygamists of this order have been excommunicated from the church.

This internal strife is thus a very complex affair. It is not only a conflict between the orthodox and the unorthodox but a contention between the orthodox polygamists themselves. But the one which need concern us here is the struggle going on between the radical and unorthodox members on the one hand and the conservative and orthodox on the other. There are important conditions which tend to keep these two factions actively at war.

We have already observed the main reasons why the orthodox Mormon element cannot easily give up the polygamous doctrine. (1) It was divinely revealed and taught by the prophet as a sacred marriage relationship accepted by God from the beginning of time. (2) Many of the leading men of the church had plural wives and to break up the family would mean great suffering on the part of the women and children. They had already made great sacrifice for what they regarded to be a sacred marriage relation and now to be disowned by husband and father seemed unfair and inhuman. (3) Again, polygamy is regarded as the means whereby the great ideal of the kingdom, here and hereafter, is realized. Says President Woodruff:

> The reason why the church and Kingdom of God cannot advance without the Patriarchal Order of marriage is that it belongs to this dispensation just as baptism for the dead does, or any law or ordinance that belongs to a dispensation. Without it the church cannot progress. The leading men of Israel who are presiding over stakes will have to obey the law of Abraham or they will have to resign.[1]

President Taylor said: "If we do not embrace that principle soon, the keys will be turned against us. If we do not keep the same law that our Heavenly Father has kept we cannot go with him." And (4) finally it was polygamy for which they had for nearly half a century endured persecutions. The very fact that it had required sacrifice magnified the importance of the institution in their minds. It had become the one phase of their religion which created discussion when all other points of doctrine passed into oblivion. It absorbed the attention and thus became the most sacred institution in the Mormon religion.

But there are also forces at work which tend in the opposite direction. The strong emphasis which is now being placed upon evolution in the high-school and college courses of the state is causing the young people to realize that the doctrines of their religion are in process of change. The orthodox class claim that the social institution is absolute and eternal. This does not appeal to the young people, who are interpreting the notions and institutions of the past as products of social conditions then prevailing. Polygamy might have been the most desirable form of marriage among the patriarchs of ancient Israel when the ideals and mode of life were quite different from those which now prevail, but to reintroduce the old institution is too radical a departure from the present standard to be uncritically accepted by the educated young people of the church.

Again, the ideal of a large family does not appeal to the younger Mormon generation with the force that it did to the pioneer fathers.

---

[1] Cowley, *Life of Wilford Woodruff*, p. 542.

The economic conditions are such that parents cannot now raise a large family and maintain the standard of living which present society demands. It is a greater tax on human energy to raise a family of three children under present conditions than it was to raise a family of six children in early Utah days. Again the great variety of opportunities open to those who have a sufficient income along all lines of education attract the attention of the young people away from the old family ideal.

There is also at the present time a tendency toward free social intercourse between the children of Mormon and gentile parents. The old prejudices are breaking down and the non-Mormon influence is being more directly felt. In fact there is an increasing number of marriages between Mormons and Gentiles and a relatively decreasing number who are each year married in the temples of the church. This situation is keenly felt by the older members of the church. Parents who have sincerely believed all their lives that marriages within the church and in the temples are the only marriages which God recognizes find it extremely disappointing to see their children treat this sacred matter with indifference.

And finally, the independent attitude of the young women in Utah would prevent the continuance of polygamy even though the government and the church favored its practice. Due to economic and social conditions, women in Utah, in common with their sisters everywhere in the civilized world, have developed an independence of life which would make such an institution today impossible. While the Mormon people have generally given woman as much freedom as she has enjoyed elsewhere in the country, the philosophy of polygamy has in many cases led the men to regard her as little more than a means of bringing children into the world. When man's glory is stated in terms of posterity, the value of woman to him lies in her power to thus contribute to his glory. The sentiment of women today is such that she will not thus sacrifice her personality and especially does she object to the sharing of her husband's affection with another woman.

The very institution which caused strong prejudice and persecution from without in early Mormon history is now causing dissension within; the same force that created group solidarity is now destroying it. The institution of polygamy maintained itself so long as it met with strong opposition outside of the Mormon group and so long as the native instincts and Mormon institutions controlled the individual within the group, but when the external pressure was removed and educational opportunities developed a variety of values and interests within the community, the institution of polygamy began to crumble; and before long it will cease to be a problem in Utah.

CHAPTER XI

THE ETHICS OF MORMONISM

The laboratory for ethical study is the field of human history in all of its aspects—political, economic, and religious. The unit is the social group in the process of its evolution. All forms of social control, whether in the nature of sentiments, customs, laws, or divine commandments, have their origin in active social life. In the development of moral standards every human instinct, every interest, every problem which has concerned the community, whether inherited from the past or imposed by the environment, has had its effect. The meaning and significance of moral standards can be ascertained only by a study of their origin and function in a concrete, active social process.

The life-history of the Mormon group furnishes suitable material for such a study. In the first place the group has developed in almost complete isolation. This makes the task of singling out the factors which have determined its moral standards relatively easy. In the second place the Mormon group has been subjected to very frequent and radical changes in its environment. These conditions have occasioned readjustments which are significant not only from the social and psychological but from the ethical point of view. A transition from one social stage to another reveals certain aspects and principles in human life which would not be noticed under less active social conditions. And, thirdly, we have here the complete life-history of a group. We are thus able to view the moral standards in relation to their origin, their function, and their termination.

The moral concepts in Mormonism have developed out of vital group experiences. Thus to give a satisfactory account of them we must consider them in relation to the three great Mormon crises. Our discussion thus divides itself into three parts: (1) The group morality of the Mormons as the result of their conflicts with the non-Mormons of Illinois and Missouri. (2) The practical and materialistic ethical conceptions which developed out of the economic struggle in the Great Basin. (3) The present theological ethics considered as the crystallization of older group sentiments and ideals. These three stages in Mormon ethics correspond, to a certain degree, with three common ethical points of view. The attitude in the first stage resembles that of the sentimentalist, conceiving morality as a feeling attitude. The second stage is essentially the utilitarian attitude. The material welfare of the community seems to be the ethical criterion. In the third stage we have a sort of casuistic attitude. Morality is here regarded as a matter of adhering to a code of rules or commandments.

Although the concrete material presented in this chapter is selected to illustrate what is essentially peculiar to the Mormon ethical life and to each of the three stages in their ethical development, it should not be inferred from this that the general moral standards and ethical notions of the Mormon people are essentially different from those of other people or that there is an absolute difference between the moral attitudes of the three levels in Mormon moral evolution. There are more similarities between the Mormon and non-Mormon ethics than there are differences; and so also there are more similarities between the three stages than there are differences. However, the fact that there are differences, whatever the degree may be, is still significant and presents a real problem. Our effort is to make clear these distinctions and give an explanation for them. The material selected and the method employed should do this without at the same time conveying the false impression of absolute distinctions. While there are variations in the moral standards of different groups and within social groups there is also unity and continuity without which differences would have no meaning.

Before entering upon the main problem of this chapter it is necessary to state briefly the psychological premises of our discussion. It is here maintained that the moral self is essentially social and that the individual becomes conscious of moral values just as he does of every other class of interests through a process of action and reaction with the other members of his group. Our second proposition is that the moral sentiments of Mormonism are mainly group sentiments, simple and intense in the first stage but developing through the problems of the second and third stages into a more complex system of group control. These group sentiments are personified in the God of Israel. He is the embodiment of the moral concepts of the group. Although these principles have been sufficiently demonstrated in previous chapters and may here be regarded as premises of our discussion, yet their direct application in this connection will more fully establish their validity.

I

The first period in Mormon history, the period in which Joseph Smith was prophet to the group, we have already characterized as that of great excitement and intense emotional experiences. It was the period of visions and revelations. Practically all the revelations that were ever given to the church came at this time. It was the time of miracles, or prophecies, of signs and wonders. It was the time when "whole villages" were converted in a day and hundreds apostatized at the same time.[1] It was the period of uncertainty, of instability. Psychologically, it was the stage of alternate joy and sorrow, of great love and intense hatred. It was the initial stage of Mormonism, when the group was being formed and its attitudes established.

We have pointed out in previous chapters how the Mormons appropriated both the name and the traditions of ancient Israel; and how this imitation of ancient ceremonies and of Bible language, and the claims to revelation and divine authority, tended to create prejudice and persecution against Joseph Smith and his followers. Out of this conflict developed, as we have observed, the Mormon group spirit. We shall now see how this group spirit affected the moral attitude of the people. The revelations and sermons and literature of this period clearly reflect the moral sentiments.

We have here the characteristic traits of group morality. All people outside of the group were enemies and all within the group were brethren. The God of Israel was the God of Mormonism and the devil ruled over the Gentiles. "The devil shall have power over his own dominion," says the revelation, "and the Lord shall have power over his Saints and shall reign in their midst and shall come down in judgment upon. . . . the world."[2] And again, "Let all the Saints rejoice, therefore, and be exceeding glad, for Israel's God is their God and He will mete out a just recompense of reward upon the heads of all their oppressors."[3] These were not simply the expressions of Joseph Smith. They were the sentiments of the group. They expressed the spirit which transcended the life and spirit of any one individual. The God of Israel, the spirit of the group, was speaking.

God was on the side of the Mormon group and would punish all who rebelled against the chosen people. "And the rebellious shall be pierced with much sorrow" and he who will not hear the voice of the servants of God "shall be cut off from among the people" and "shall perish in Babylon, even Babylon the great shall fall."[4] But, on the other hand, observe the sentiment toward the Mormon group. "Therefore, fear not, little flock, do good, let earth and hell combine against you, for if ye are built upon my Rock, they cannot prevail."[1] And again, "Awake! O Kings of the earth! come ye with your gold and your silver, to the help of my people, to the home of the daughters of Zion."[2]

---

[1] O. F. Whitney, *Life of Heber C. Kimball*, pp. 181–93, 194–99.

[2] Joseph Smith, *Doctrine and Covenants*, Section 1:35–36.

[3] *Doctrine and Covenants*, Section 127:3.

[4] *Ibid.*, Section 1:3, 14, 16.

These expressions, while imitative of Old Testament prophets, did reflect the Mormon group spirit. In fact the Mormons regarded themselves as belonging to the Israelitish group and of the same blood. And all who are of the blood of Israel are favored of God but the "rebellious are not of the blood of Ephraim, wherefore they shall be plucked out."[3] This enlargement of the group to include ancient Israel gave strength to the group sentiments. The tribal God of ancient Israel and the animosity which Israel held toward other tribes seemed to correspond to the spirit of Mormonism at that time and was easily taken over into its own group life.

Group morality was also shown in dealing with the members of the group. The great sin was disloyalty. This was a sufficient cause for excommunication. The following cases are illustrative: W. W. Phelps and John Whitmer were severed from the church for "selling their lands in Jackson County" and thereby setting "an example which all the Saints were liable to follow." To sell their inheritance in Zion "was a hellish principle, and. . . . they had flatly denied the faith in so doing."[4] David Whitmer was excommunicated for "leaving or forsaking the cause of God, and returning to the beggarly elements of the world, and neglecting the high and holy calling according to his profession."[5]

It was this bitter group antagonism which gave birth to the sentiment of fellow-feeling and brotherly love which is so characteristic of the Mormons, especially during their early history. It was a despised enemy which made them conscious of their beloved brethren. The fact that the entire group focused its attention upon the enemy was the essential condition for sympathy within the group. It was the common object of hate which conditioned the common object of love. The individual becoming so completely merged into the activity of the group lost consciousness of personal interests. His entire life became identified with his group. The self was a group self; it was made up of the combined interests of all the brethren. When they suffered he suffered in a very real sense. Nor did he imagine himself in their position as Adam Smith would say. The individual immediately and directly felt the sufferings of his brother. And he did it because he found himself within the life of his brother. Regarded from the point of view of group consciousness, Bulter is quite right when he says "that we were made for society" and "that the principle of benevolence is as natural in man as is self-love."

---

[1] *Ibid.*, Section 6:34.

[2] *Ibid.*, Section 124:11.

[3] *Ibid.*, Section 64:35–36.

[4] Whitney, *Life of Heber C. Kimball*, pp. 196–97.

[5] *Ibid.*, p. 198.

The mistake which Adam Smith made (and which was also made by the moral sense school) is in treating the individual's life as distinct from that of his brother. The brother is regarded too much as the *other* person. Fellow-feeling is impossible toward individuals considered as *others*. No power of imagination could have created a sympathetic feeling between the Mormons and Gentiles. This was because the behavior of the two groups toward each other had placed them in entirely different spheres. Sympathy is had only among individuals who live the same life, follow common interests, experience common joys and sorrows.

But Adam Smith recognizes the dependence of sentiments upon social relations. He says:

> Were it possible that a human creature could grow up to manhood in some solitary place, without any communication with his own species, he could no more think of his own character, of the propriety or demerit of his own sentiments and conduct, of the beauty or deformity of his own mind, than of the beauty or deformity of his own face. All these are objects which he cannot easily see, ... and with regard to which he is provided with no mirror which can present them to his view. Bring him into society, and he is immediately provided with the mirror which he wanted before. It is placed in the countenance and behavior of those he lives with, which always mark when they enter into, and when they disapprove of his sentiments; and it is here that he first sees the propriety of his own passions, and the impropriety, the beauty and deformity of his own mind.[1]

But Adam Smith did not carry his point far enough. Society is the mirror through which we see ourselves but it is more than that: it is in society that we actually find ourselves. We actually grow up in the mirror, and are nothing apart from it. All human sentiments originate in society, and by it are maintained and given direction.

The sympathetic feelings are highly relative. They depend upon social affiliation. An individual may have a kindly feeling toward the members of his own group and the greatest animosity toward the members of another group. In fact the moral sentiments are largely dependent upon group consciousness. Altruism, charity, benevolence, pity,

[1] Rand, *The Classical Moralists*, p. 456.

and all forms of fellow-feeling are, according to our observation of Mormon group life, essentially a matter of group consciousness.

The conclusions of our investigation of the early period in Mormon history may thus be briefly summarized. In the first place we have observed that the moral sentiments of the Mormons have developed out of group life. These sentiments were reflected through the God of the group, who took sides with the oppressed against the oppressors. Sympathy toward the members of the group and animosity toward the members of the other group grew side by side, tending to show that these sentiments mutually support each other. The morality of this period we thus found to be essentially on the level of group morality. The individual's life was almost completely immerged in that of his group. The great virtue was loyalty and the great sin apostasy. The moral self, being so completely identified with the group, is impulsive, imitative, and sentimental.

II

The ethics of the second period is made up of the group sentiments of the first period and the new moral values which grew out of the colonizing problem of the second period. The moral standards are now tending to become more materialistic and more practical. The sermons are not now so much concerned with the war between God and the devil, between Israel and Babylon as they are with such subjects as obedience to authority, the strength of union, the sacredness of marriage, and the glory of a large posterity, the blessings of industry and the curse of idleness. The good man is now not only loyal to the group but efficient in its service.

The closing days of the life of Heber C. Kimball were spent in pioneering the new country. His activities were typical of the Mormon leaders at that time. It is interesting to compare his life in Utah with that of Joseph Smith and other Mormon leaders of the first period. In reference to his activity Apostle Whitney writes:

> Preaching, colonizing, traveling through the settlements, encouraging the Saints in their toils and sacrifices, sitting in council among the leaders in Israel, ministering in sacred and holy places, and otherwise laboring for and blessing the Lord's people—so wore away the remaining years of President Kimball. . . . . His name was literally a "household word" in Israel. "Brother Heber" was everywhere honored and beloved.[1]

Thus, in the first period the Mormon prophets led the "hosts of Israel" against Babylon; they were at constant war with the enemies of God and his people. In the second period the prophets of "Israel" were laboring for and blessing the Saints and sitting in council among their brethren. The new problems had created new demands, another class of virtue, a new type of prophets.

---

[1] *Life of Heber C. Kimball*, p. 441.

The new social and economic demands required something more than implicit faith in the divinity of Joseph Smith's mission and more than mere loyalty to the group; it required foresight, direction, rational leadership, system, and organization. The leaders of the people must now prove their right to lead by their ability to serve their brethren. The institutions of Mormonism must prove their divinity by their capacity to function. Thus, utility and efficiency were added to the group sentiments already established. The social self is not now merely the Mormon group fighting the gentile group; it is the self engaged in building up a great kingdom and one that is fully conscious of its detailed demands such as the constructing of roads, canals, forts, planting colonies, raising large families and going on missions. The moral individual is one who is willing to join in these many enterprises, who is industrious, unselfish, and possesses the ability to serve the community in realizing its aims.

The moral ideals and principles of social control, we shall see, were influenced by the problem then confronting the group. The great problem was to establish Zion in the mountains, to build up the Kingdom of God. And this, as we have observed in Part II, was more than a mere spiritual ideal, it was a very real task which the new condition had imposed upon the people. To realize it, meant life to the community and to fail, meant death and destruction. There were three ways in which the individual might serve his community in realizing this end: (1) as a colonizer, i.e., one who was efficient in any sort of economic community enterprise; (2) as a missionary to carry on the great proselyting program so essential in developing a strong population; and (3) as a patriarch, the head of a large family.

1. The colonization program embraced every line of economic activity and consequently every man, woman, and child capable of doing any kind of labor was actively engaged in this enterprise. The whole undertaking being essentially a community affair was conducted under the supervision of the priesthood. Thus, besides being industrious and socially efficient, the individual must obey the authority of the priesthood. This relationship is clearly revealed in an extract from a letter written by President Heber C. Kimball, to his son then on a mission to England. The letter was dated February, 1856.

> There has been court in session here for weeks and weeks and I suppose that one hundred and fifty or two hundred of the brethren have been hanging

> around, with the council house filled to the brim. This scenery continuing for a long time, one day Brother Brigham sent Thomas Bullock to take their names, for the purpose of giving them missions, if they had not anything to do of any more importance. So Brother Brigham counseled me to make a selection—for Los Vegas, some thirty, who are ordered to sell their possessions and go with their families as soon as the weather will permit, for the purpose of going down on to the Rio Virgin to raise cotton; another company of forty-eight to go to Green River to strengthen up that settlement, make farms, build mills, etc., and some thirty-five or forty to go north to Salmon River, ... some thirty to go to Carson Valley, ... some thirty to go into the lead business near the Los Vegas; and eight to go to the East Indies. There are eighteen called to Europe, and seven to Australia.[1]

This right which the ecclesiastical authorities held over those of lower rank in all matters of community concern is very significant. Although a strong group spirit had been created long before this and although people had been disciplined in obedience to group authority before they undertook colonization in the mountain valleys, yet the unity of action prior to this time was that of direct group control. A strong group spirit was felt by every individual. The constant pressure from an opposing group made the members within the Mormon group very sensitive to social suggestions. But this warm, first-hand spiritual control was not possible in the new situation where the external social pressure had been practically removed and where the communities were scattered among the valleys of the great mountainous country. The control must now become more a matter of personal authority.

But although the control now became centered in individuals who held the priesthood there was still a recognition of the group back of this priestly authority. The priesthood is the authority of God and symbolizes the authority and power of the group. By means of this symbol and the recognition which it received, the colonizing enterprises could be systematically carried on. But for the leader in this period priesthood alone was not sufficient; the situation, without minimizing the importance of the former, demanded ability also. And in this respect the demand is greater than that of both the first and third periods. The economic situation was too grave for a man who was not efficient and useful to the people to remain long at the head of a colony. The people were now conscious of the purpose of leadership, and the successful pioneer could command obedience because he actually became a hero in the great struggle.

---

[1] *Life of Heber C. Kimball*, pp. 420–21.

But not only did the colonizing problem create a new relation between the people and the priesthood, it created a new attitude within the group, of the individuals toward one another. The brotherly feeling was now developed on a utilitarian basis. The brother was needed in the building of canals, roads, and forts. The manufacturing and commercial activities demanded united effort. On every hand the individual found himself compelled to co-operate with his brethren. This co-operative effort was felt to be so important that many of the colonizing enterprises were preceded by a rebaptism for the purpose of bringing "the new colony under perfect organization, socially as well as ecclesiastically."[1] Out of this practical co-operative relationship, this common struggle to build up their Zion, we have a moral relation of a higher order than that which maintained in early Mormon history. The moral sentiments developed out of a more practical and more normal social relation. The self enlarged to include others in a more complex system of values. John Stuart Mill's explanation of moral sympathy is quite adequate here:

> Not only does strengthening of social ties, and all healthy growth of society, give to each individual a stronger personal interest in practically consulting the welfare of others, it also leads him to identify his feelings more and more with their good. . . . . He comes, as though instinctively, to be conscious of himself as a being who of course pays regard to others. The good of others becomes to him a thing naturally and necessarily to be attended to, like any of the physical conditions of our existence.[2]

2. Just as every good man in Israel was an active colonizer at that time, so every man was expected to fulfil a foreign mission. In fact proselyting was a part of the colonizing scheme. The following taken from the official organ of the church (1851) illustrates how the colonizing and the proselyting work of the church went hand in hand.

> The estimated fifteen thousand inhabitants in Deseret, the past year, have raised grain sufficient to sustain the thirty thousand for the coming year, inspire us confidently to believe that the thirty thousand the coming year can raise sufficient for sixty thousand the succeeding year and to this great object and end our energies will be exerted to double our population annually. . . . . [3]

Thus we may note, besides the hopeful spirit which is here revealed concerning the growth of Zion, the unity of purpose which underlies both the colonizing and the missionary work. It was regarded as a matter of course that the Saints at home should prepare to feed and care for the thousands who were to immigrate every year. Brigham Young said:

---

[1] *Tullidge's Magazine*, III (July, 1884), 233.

[2] Quoted by Rand, *The Classical Moralists*, pp. 666–67.

[3] *Millenial Star*, XIII (1851), 51.

> It is also a true principle that a man should keep not only his property but himself upon the altar, ready for sacrifice at any moment; to do with all his might the will of his maker regardless of the consequences to his property or himself or any thing that pertains to him.[1]

But not only were the missionaries expected to increase the Mormon population but they were to furnish the community with skilled mechanics. In a later volume of the same paper we read the following instructions from the mission president to the conference presidents:

> The first presidency of the church at the Valley has sent express instruction in relation to all kinds of mechanics and manufacturers. . . . . And now is the time that they are wanted, for they are situated at a vast distance from all civilized nations of the earth. . . . . In order that we may become great and flourish as a people, it is highly necessary that we have manufacturers in our own midst. . . . .[2]

Thus in regard to this stage of Mormon ethics Hume is right when he says: "The social virtues are never regarded without their beneficial tendencies, nor viewed as barren and unfruitful" and that "utility . . . . forms, at least, a part of their merit, and is one source of that approbation and regard so universally paid to them."[3] The sentiments created by the group struggle of the first period were not weakened by the conception of utility which the second period in Mormon history tended to develop. The brotherly feeling now received meaning. It was now consciously desired. It becomes a real standard which the individual endeavors to attain himself and which he requires of his associates.

3. The control of sex relationship has always constituted one of the most important moral problems of the race. Social customs have always served as the strongest factor in this as in every other vital social moral relation. Monogamy has, through ages of social evolution, come to be the form of sex relation generally adhered to among different peoples. While individuals among civilized as well as among primitive peoples, at times, violate the social customs it is very extraordinary for an entire people to depart arbitrarily from the established form of marriage relations. Especially is it surprising for a church to assume the responsibility in the Christian era when sex purity and celibacy were regarded as among the greatest virtues. Our problem here is to explain how the Mormon mind could be brought to justify morally the institution of polygamy or the patriarchal form of marriage.

---

[1] Brigham Young, *ibid.*, XIV, 214.

[2] *Ibid.*, XVI, 362.

[3] Quoted by Rand, *The Classical Moralists*, p. 431.

If moral values existed apart from the life of the social group or if they were the outcome of pure reflective processes it would be a difficult task indeed to account for this radical departure from general social sanction. But when we apply our principle that moral values are really group sentiments and that they depend on the one hand upon group tradition and on the other hand upon the immediate vital problems of the group the explanation is not difficult.

The Mormons, we have seen, had identified themselves with ancient Israel. The sentiments and traditions of that ancient people became the sentiments and traditions of Mormonism. On the other hand, the Mormons had almost completely isolated themselves both socially and physically from all civilized peoples. They lived in a different atmosphere from that of the peoples of the world. The sentiments of "Babylon" were not to control their lives. They hated Babylon and any departure from its ways was regarded by them as righteousness. But they loved Israel and longed to imitate its institutions. Thus they considered polygamy, which was of Israel, more sacred than monogamy which was the common practice of the rebellious world.

But polygamy was also justified on the basis of utility. The patriarchal order tended to increase the Mormon population and thus added strength to the kingdom. Brigham Young, Heber C. Kimball, Orson Pratt, Lorin Farr, and scores of other patriarchs[1] who had no fewer than forty and some even more than sixty children were the great men of Israel. Should this system have continued and should the members of the church have followed generally the example of their leaders, Zion would soon have felt its strength through its growing population. This was no doubt the motive which led President Woodruff to remark that the "church and Kingdom could not advance without it" and that "the leading men of Israel who are presiding over stakes will have to obey the law of Abraham" or resign.[2]

The moral self thus became identified with the new and more complex aims of the group. Sentiments grew up about these interests until they became sacred and, as we shall see in our next division, fixed attitudes of mind. Thus, to the old group sentiments of the first period which formed the subconscious basis of the Mormon ethical life, we have added utilitarian ideals and standards, all of which are transmitted to the third period.

[1] Whitney, *History of Utah*, Vol. IV.

[2] Cowley's *Life of Wilford Woodruff*, p. 542.

III

The transition from the second to the third stage of Mormonism is marked by two important conditions, the coming to a close of the great colonization movement and the abandonment of the patriarchal order of marriage. In consequence of this, the Kingdom of God was deprived of its real, concrete, and material content and began to be defined more in terms of a church organization and spiritual authority. The New Jerusalem was still the social ideal but no longer a city to be built immediately in this world but one which Christ will build when he returns to earth. The material aims tended to become spiritual ideals.

Heretofore very slight distinction was made between the spiritual and the temporal affairs of the church. They all belonged to the Kingdom of God and the church claimed the right to exercise its authority in any direction. But when sufficient private capital had accumulated and the individuals began to feel their own strength and could undertake business enterprises without the aid of the church its influence in economic matters began to decline. The state began to assume greater responsibility and was becoming stronger in all lines of general community interest. The individuals were beginning to assert themselves through the institutions of the state. The church was forced to confine its activities to that sphere in which the older group sentiments still hold sway. Its sphere was becoming less temporal and more spiritual. Its attention was being turned to its traditions, and its function was becoming more and more that of conserving its institutions and group sentiments.

This new situation has put the church on the defensive. Its problem now is to protect its own sentiments and institutions and to defend the faith. The good man now is a staunch defender of the institutions and true to the faith. The following hymn reveals the sentiments which the orthodox members are struggling to establish among the youth:

Shall the youth of Zion falter,
  In defending truth and right?
While the enemy assaileth,
  Shall we shrink, or shun the fight? No!

True to the faith that our parents have cherished;
  True to the truth for which martyrs have perished;
To God's command, soul, heart, and hand,
  Faithful and true we will ever stand.[1]

---

[1] *Songs of Zion*, No. 179.

Just as the foregoing hymn illustrates the stress that is placed on old sentiments so the following statement from a recent sermon illustrates the attention that is now given to laws, form, and institutions.

> God has given unto his children a code of laws: faith, repentance, and baptism by immersion for the remission of sins, by those who have authority, to administer in the ordinances of his kingdom, the laying on of hands for the gift of the Holy Ghost, the law of tithing, the law of consecration, the law of sealing ordinances in the house wherein man and woman are sealed for time and all eternity, and all the various cardinal principles of the gospel. These are the laws of our being, unto which we must subscribe if we would inherit the earth when it has lived its laws, that we may live upon it many, many years.[1]

Of these "cardinal principles" faith is the most basic. It is the sacred duty of every member of the church to believe implicitly in the divinity of Jesus Christ, in the revelations of Joseph Smith, in the authenticity of the Book of Mormon, in miracles and spiritual gifts. He must believe in the divinity of the priesthood and in the idea that all the organizations of the church are sacred institutions established by God. He must accept the literal interpretation of the Bible. The man who does not have this state of mind is not a good man in a positive sense. Morality without faith is negative and does not lead to the highest spiritual life. Faith means spirituality "and without spirituality there can be no vital living morality."

The following brief statements made by church authorities in the recent general conferences illustrate the importance that is now attached to faith. According to C. W. Nibley the mission of Mormonism is to protect the faith.

> Now here is the mission of Mormonism. Here is the great need of this church, that faith shall not be abolished from the earth, from the hearts of the children of men. . . . . We believe in education, but some of us send our children away from home to be educated, and many of them come back seemingly determined to claim relationship with the apes rather than with angels.[2]

According to Reed Smoot, Christianity is endangered by heresy.

> I care not for the cranks that may arise from time to time, for their lives are short; but it seems to me that when a man like Dr. Charles Eliot . . . . comes out and announces as a new doctrine a faith that denies the divinity of Jesus Christ, that denies that man is made in God's image, that denies the authenticity of all biblical miracles, the efficacy of prayer, the supernatural value of sacrament, the merit of self-sacrifice, and even denies the immortality of the soul, it strikes me . . . . that there is danger for Christianity among the people.[3]

---

[1] W. H. Smart, *Eighty-seventh Annual Conference Report*, pp. 95–96.

[2] *Eighty-first Annual Conference Report*, pp. 54–55.

[3] *General Conference Report for 1909.*

Faith is worth more than life according to Joseph F. Smith:

> Every device possible to the understanding and ingenuity of cunning men is being used for the purpose of diverting our children from the faith of the gospel and from the love of truth. . . . . I would rather take one of my children to the grave than I would see him turn away from this gospel.[1]

This defensive attitude of the orthodox Mormons reflects the present conflict. Faith in church dogma has become a moral value which has grown out of the present social situation. It is the great virtue of today just as loyalty was the great virtue in the first period, or efficiency and industry in the second period of Mormon history.

To honor the priesthood in the pioneer days meant to obey those who were endowed with its authority. But high priestly authority and capacity for leadership usually went together. In fact the priesthood increased its power and sanctity through the social service which it rendered. It possessed utility and could command obedience because of it. To honor the priesthood in recent years is not so much a matter of obeying it for the purpose of realizing a material benefit as it is to recognize its divinity and refrain from criticizing and speaking ill against the "Lord's Anointed." This attitude toward the ecclesiastical authorities, like the attitude toward faith has grown out of internal conditions. It results from the growing critical spirit among the younger members of the church. The orthodox element feels a need for putting itself on the defense. Thus says Joseph F. Smith:

> Fathers and mothers in Israel, will you try to teach your children . . . . that the Prophet Joseph Smith restored again to the earth the priesthood which was held by Peter, James, and John. Teach your children to respect their bishops and the teachers that come to their homes to teach them. . . . . teach them to honor the priesthood which you hold.[2]

As the controlling power of the group weakens, the priestly authority becomes less positive. Thus Brigham Young could command when the prophet of today may only advise and counsel. Brigham Young could exercise the authority of the priesthood in nearly every line of community or individual interests. The present leader must confine the exercise of his priestly influence within certain limits. These limits are fixed by group sentiments. When he extends his activity into political and industrial affairs he meets with opposition from those who do not feel the old group sentiments. Only the older members of the church recognize the voice of a prophet in these matters. The following remark of Apostle Talmage illustrates the situation and the struggle which the church leaders are having to maintain the desired attitude toward the prophet:

---

[1] *General Conference*, 1909, pp. 2–8.

[2] *Eighty-seventh Annual Conference Report*, p. 5.

> I have met here and there a disgruntled one, one who is saying, "Why don't we receive further revelation from God today?" We are receiving it day by day. . . . . If ever the church of Christ was led by a prophet enjoying communion with God . . . . and none of us can doubt such leadership in the past—this day witnesses that condition. I testify unto you that the man who stands at the head of this church is the mouth piece of God unto his people, and if we fail to heed his words, his admonitions, his instruction given unto us as they have been, and are, in love and nevertheless with firmness and with no uncertainty of tone, we bring ourselves under condemnation.[1]

Again, since the priesthood represents the authority of the group and since the power of this authority depends upon the traditional attitudes and old group sentiments, the field of its activity tends to be limited largely to the preservation of forms and sentiments already established. Thus, unlike conditions in the colonizing period when the initiative was taken by the higher church authorities, today the social reform movements in Mormon communities are undertaken by the younger men and women, who hold subordinate positions in the church.

Thus, out of active, enthusiastic, and practical group sentiments has emerged a system of formal laws or duties. What were once means to an end have now become ends in themselves. Tithing was once a means to the building up of God's kingdom but now it is a duty to pay tithing whether the church needs the money or not. It is a duty for a man to go on a mission when called by the divine authority although he may question his qualifications to preach the gospel. It is his duty to have faith in all the doctrines of Mormonism although his experience may lead him to doubt the validity of some of them.

In conclusion, let us review the evolution of Mormon ethics with reference to our three basic psychological principles. In the first place we have observed that the moral self was identical with the social or group self. In the first stage the self was completely merged in the group. The moral life was therefore relatively simple, to be loyal to "Israel" and remain responsive to the suggestions of the group. In the second period, the group developed more complex aims. The moral self became more reflective and less impulsive. The individual was now able to distinguish between his social self and his egoistic self. In the third stage the social self is identified with the traditional and customary attitudes of the group. The moral self is now one who keeps the faith and observes the laws and forms of the church.

---

[1] *Eighty-eighth Annual Conference Report*, p. 161.

Altruism and egotism are thus found to be relative matters. In the early group conflict the Mormon people were egotistic in their relations with the opposite group but very altruistic in dealing with one another. However, not until the economic problems of the second period presented themselves did the people become fully conscious of this as a moral principle. It was the removal of the external social pressure and the concentration of attention upon the group's own welfare which made it possible for the individuals to recognize a moral obligation as such. But even in the second period moral obligation did not often extend beyond the members of the group. However, in the third stage, the growing commercial, political, and educational intercourse with the outside world is having the effect of extending sympathetic relations and a sense of obligation to people outside of the group.

As to our second proposition, we have observed that the moral evolution was essentially an evolution of sentiments. The early group life was impulsive and emotional and out of this developed the most basic and permanent Mormon sentiments. These sentiments became definitely attached to certain persons, institutions, and events. In the second period other sentiments developed, peculiar to the pioneer life. All these sentiments have accumulated and represent in the third period very definite and fixed attitudes. The orthodox Mormon has always found morality on the side of these sentiments, and associated immorality with the spirit and life which has opposed them.

But these group sentiments, as we have observed, are well personified in the God of Israel. This personification has made the transition from one stage of Mormon moral standards to another more obvious. Thus, in the first stage, God was engaged in protecting his "chosen people" and punishing the "rebellious." Under His special direction the Saints were led in battle against the devil and his followers. The true servant of God at that time was one who was loyal and submissive to the will of God. In the second period, God became the deliverer of Israel from the persecution of the enemy. He led his people to a land of refuge. He made their land productive and increased their storehouses. He assigned his people a practical task, to build up his kingdom. An efficient servant was rewarded with a home in Zion, with a large family and with flocks and herds. In the third period, God has become a law giver to his people and a defender of his priesthood and the sacred institutions of the group. The reward for righteousness is now spiritual; it is salvation in the Kingdom of Heaven.

CHAPTER XII

THE POSSIBILITIES FOR ADJUSTMENT

From the practical point of view the outcome of the present internal conflict is a most vital question. The maladjustment which existed between the Mormons and the Gentiles is practically overcome, and so is that between the Mormons and the arid country. We have observed the strife between science and Mormon theology, the contradiction between the business interest of the priesthood and the spirit of industrial democracy, we have observed the contentions occasioned by the Mormon marriage institutions and finally traced the development of Mormon ethical ideals and standards. In treating these problems we have been concerned more with the interpretation of the different factors involved in the conflict than with the social value of the process itself. What will these tendencies lead to, and of what practical value are they to the group? These are questions deserving attention.

The dogmatic opponent of Mormonism regards all of its institutions as positively bad and as directly hindering progress. To him the solution of the problem is the elimination of all that is Mormon. The orthodox Mormon, on the other hand, believes that all the institutions of his church are divine and essential to the great plan of human salvation. His solution of the problem is the silencing of critics and heretics. The ideal situation, in his mind, is for every member of the church to accept with implicit faith every word that falls from the lips of the prophet and obey unhesitatingly the authority of the priesthood. Or as one of the apostles of the church expressed it: "I would that the faith of all Israel increased to the point that every man, woman, and child would say, 'I know not save the Lord commandeth.'" To the unprejudiced mind neither of these attitudes points the way to progress.

Conflict is neither bad nor good in itself. It may result in destruction or it may be the condition for progressive reconstruction. The internal conflict simply reveals the fact that a crisis has come and a change is about to take place. This change may destroy the group life or it may strengthen it. The crisis is a warning of approaching danger and an opportunity for progress. Without it Mormon religious life would be reduced to a dead level. Such is the case in some of the rural communities where the new critical spirit has not yet expressed itself. In such places religious discussion consists largely of repeating religious dogma, retelling the old Mormon and gentile struggles and relating the experiences of the pioneers. Even in some of the general conferences of the church in Salt Lake City, the sameness of thought and expression becomes so monotonous that the most sympathetic member indicates weariness. But the majority of the people favor harmony rather than discord for the former is the true spirit of the gospel, but confusion is prompted by the devil.

The proper adjustment is not to be brought about by prohibiting criticism nor can it be made by eliminating wholly the old institutions and traditions. Criticism provides the occasion for readjustment and progress. On the other hand institutions and traditions tend to retain the social standards already established and give stability to the life of the community. They function in the life of the community just as habits do in the individual. They form the automatic side of conduct, maintain unity and order among the basic relations of life, and thus set free the voluntary elements of consciousness to work out new modes of behavior. They constitute fundamental factors in the control of the individual life as well as in that of the social group. Progress may build more certain attainments by utilizing these historical accumulations than by ignoring them. The reason why many social revolutions have failed to realize very valuable aims is because the basic factors of social control were disregarded. No effective reconstruction in Mormonism will be had unless its sentiments and institutions are turned to good account. Real progress presupposes proper social continuity.

To overcome the present maladjustment two concessions must be made. On the one hand every institution of Mormonism must be subjected to the searchlight of science, and scientific truths, in so far as they provide human welfare, must be considered as sacred as religious truths. On the other hand the educators of Utah must be willing to analyze the Mormon institutions with the true impartial attitude and recognize the desirable as well as the undesirable qualities. In short, prejudice must be removed from both sides before real progress can be attained. The ideal situation will be more fully realized when the church will make more frequent use of scientific experts to aid in its many educational enterprises, and when the college graduate will regard the church, of which he is a member, as an organization through which he can render social and moral service.

We have already discussed in different connections the importance of attention in determining the various aspects of the spiritual life of

Mormonism. We have observed how the strong concentration of group attention added divinity to the leaders, magnified the importance of historical events and places and how, through this factor, institutions became sacred. A long history of such centralized group consciousness accompanied by great emotional excitement has created strong Mormon sentiments toward the past and its accumulations of institutions so that it is difficult to direct attention upon present-day problems. Many of the Mormons seem to live by themselves in a world constructed out of their past group life, a distinct world of discourse.

In addition to this group sentiment which directs attention toward the past there is a sort of Mormon scholasticism which has, in recent years, engaged the attention of some of the educated members of the church. It has one purpose—that of justifying the Mormon dogmas. This peculiar rationalizing tendency has developed side by side with heresy which it is constantly endeavoring to silence by argument. Besides a large number of books written with this aim, the church theological classes are making use of this line of reasoning. The old institutions and traditions are thus fortified on the one hand by sentiment and on the other by a well-developed system of theology.

Opposed to these conservative Mormon theologians stand those who are effectively bringing about a readjustment in both thought and sentiment. These people do not present direct opposition. They tend to shift the attention to the more vital problems of the day. They emphasize the present rather than the past, the immediate rather than the remote, the concrete rather than the abstract.

Among the most important of the conditions that tend to bring about readjustment is the rapid growth of colleges and high schools in the state as well as a tendency for a large number of young people to seek education outside of the state. Between four and five thousand young people of Mormon parentage are attending college every year and many times that number are in high schools. They are thus coming in contact with the educational spirit and developing a great many new ideals and values. The many possibilities of the larger life, social and scientific, are being forced upon them. These new interests are not regarded as antagonistic to the Mormon ideals, but little by little they detract the attention from creed and abstract theology.

The lines of educational interest which most directly influence this reconstruction are those of the social sciences. Courses in sociology, economics, political science, ethics of citizenship, social psychology, the psychology of religion and the scientific study of the Bible are all related

PRIVATE LIBRARY OF
M. WILFORD POULSON

directly to the local problem. Unlike some other scientific courses these not only raise the problems of interest and detract attention from the non-essentials, but they raise the main questions of conflict and point the way of adjustment. Thus young people are beginning to view the church in an objective manner and judge its institutions upon their merits. This free discussion of institutions is an "admission" that questions of authority and of dogma are not absolutely settled. When a sacred subject is once admitted to discussion it tends to lose its divinity and sometimes its vitality as a factor in control.

But while it is important that the institutions of a social group should be subject to criticism, this examination and introspection may, like the institutions, become an end itself. Institutions are not made by the power of reason altogether nor are they reformed for practical use by such a conscious effort. They are made and reshaped to a large extent while the group is in action. The more or less blind, forward movement plays also its part in selection, creation, and readaptation of both the conscious life and the social institutions. Analysis and criticism inhibits natural expression of impulses in the group as well as in the individual. It creates friction and results in the loss of energy. The Mormon group was most active when it centered its attention upon some thing outside of itself, upon an opposing group or upon some obstacle of its environment. Then thought looked outward rather than inward, and seemed to possess wonderful vitality. The group built cities, as it were, in a day; it endured great privation; it met and surmounted a variety of obstacles. But it is with a social group as with an individual, it tends to lose its vigor as soon as it becomes self-conscious. Its spirit weakens as soon as it begins to think about itself.

If the youth of Mormonism remain content with the mere rationalization and criticism of their inherited institutions, nothing worth while will be accomplished; they will end where they began, in mere reflection. What Mormonism needs today is the vitalization of its institutions, which need to be put into use rather than merely contemplated. They should function as means rather than be analyzed as ends. When Mormonism finds more glory in working out new social ideals than in the contemplating of past achievements or the beauty of its own theological system, it will begin to feel its old-time strength. The group spirit will reappear in a new form.

Mormonism of today needs to emphasize its social problems, those which are felt to be vital by all its classes, its sentimentalists, its rationalists, its critics. It needs to emphasize problems which will engage the attention of all of these; one which will unify the varied interests and at the same time force the attention away from itself. They must be problems to which every member of the church will respond. They should stimulate feeling and thought, and above all, they must stimulate action.

There is a demand for a leadership which not only possesses the sentiments of the group but which is responsive to the social and moral impulses of the times. The men who feel the spirit and needs of the hour, who are in direct contact with all the new relations of life, may be able to unite the contending factions and become the leaders of the present and future generations of Mormonism.

INDEX

Abraham, received concubines, 16, 75
Abram, Lord said to, 15, 16
Ames, E. S., quoted, 35, 73

Bishop, the temporal officer, 5
Brigham Young University, instruction and conflict, 64, 65
Brimhall, G. H., quoted, 66

Caldwell County, 22
Clay County, 21
Colonization: three problems of, 40; methods of, 42, 43, 44, 45; proselyting as a means of, 43, 44
Communistic ideal, origin of, 17
Conflict: causes of, 29, 30; significance of, 97, stages of, 8
Co-operation: commercial, 52, 53, 54, 55; in manufacturing, 50, 51, 52
Criticism: institutions subject to, 99; spirit of, 61, 62, 63, 64, 65

Doctrine and Covenants, defined, 6

Faith, as an ideal, 92
Families, large, 46, 90

God, as Spirit of group, 24, 95
Godbeite Movement, 60, 61
Group consciousness, 19, 20, 21, 22, 23, 24; stages in development of, 59

Hume, theory of, 89

Immigration, 43, 44, 45, 46
Institutions: business, 69, 70; as products of past experience, 67
Irrigation: co-operative origin of, 41, 42; necessity of, 40, 41; practices in Egypt and by Indian tribes, 40, 41

Jackson County, sacred land, 18, 24
James, William, quoted, 13

Marriage: patriarchal order of, 16; spiritual covenant of, 73
Migration, organization for, 37, 38, 39
Mill, John Stuart, ethical theory of, 88
Missouri, expulsion from, 21, 22, 23
Morality, group, 82, 83
Mormonism: and Christianity, 17; embraces temporal interests, 4; as a process of adjustment, 9; origin of, 14; moral stages in, 80

Nauvoo, an independent city, 26
Nibley, C. W., quoted, 92

Penrose, C. W., quoted, 64
Persecution, cause of, 19
Polygamy: as cause of conflict, 76; origin of, 75
President, power of, 6
Priesthood, authority and responsibility of, 5, 94
Psychology, functional, 3

Revenue system, 6, 7
Rigdon, Sidney, associated with Joseph Smith, 17; quoted, 23

Scholasticism in Mormonism, 98
Secret Constitution, 19
Smith, Adam, theory of, 84
Smith, Joseph: character of, 27, 28; inspired by group, 27, 28; sentiment of group toward, 29; religious genius, 14; use of Bible language and Israelitish ideals, 15
Smith, Joseph F., quoted, 4, 5, 67, 71, 72
Smoot, Reed, quoted, 92

Taylor, John, quoted, 54
Thomas, W. I., quoted, 74
Tithing, 6, 66, 67, 68, 92
Tulledge, T. W., quoted, 51

Union Pacific Railroad, commercial significance of, 49, 52
United Order: argument for, 51; nature of, 5

Veblin, quoted, 66

Woodruff, Wilford, quoted, 76, 78

Young, Brigham: inspired by group, 47; leadership, 36; quoted, 45

Zion Co-operative Mercantile Institution, 53, 54, 55
Zion, Land of, 15, 18

PRINTED IN THE U.S.A.

The University of Chicago

M. Wilford Poulson,

AN EXPERIMENTAL STUDY OF THE EYE-VOICE SPAN IN READING

A DISSERTATION
SUBMITTED TO THE FACULTY
OF THE GRADUATE SCHOOL OF ARTS AND LITERATURE
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATION

BY
GUY THOMAS BUSWELL

Private Edition, Distributed By
THE UNIVERSITY OF CHICAGO LIBRARIES
CHICAGO, ILLINOIS

Reprinted from
Supplementary Educational Monographs, No. 17, December, 1920

TABLE OF CONTENTS

PAGE

LIST OF FIGURES vii

LIST OF PLATES ix

LIST OF TABLES xi

CHAPTER

I. INTRODUCTION 1

Problem 1
Previous Studies 2
Apparatus and Method of Present Study 3
Subjects Examined in the Present Study 7

II. THE EYE-VOICE SPAN 9

Detailed Statement of Method 9
Units of Measure 9
Reading Selections Used 9
Explanation of Typical Records 10
Table of General Data 15
Analysis of Eye-Voice Span 17
Relation to Quality of Reading Throughout the School Grades . 17
Relation to Position in Sentence 41
Relation to Reading Rate 51
Relation to Number of Fixations 53
Relation to Regressive Movements 57
Summary of Analysis of Eye-Voice Span 62

III. CONTINUOUS RELATIONSHIP OF EYE AND VOICE 64

Method 64
Explanation of Typical Plates 65
Elastic Nature of the Eye-Voice Span 78
Relation of Eye-Voice Span to Length of Fixations 79

IV. THE EYE-VOICE SPAN AND THE RECOGNITION OF MEANING . 87

Material and Method Used 87
Oral Reading of Test Passage 88
Silent Reading of Test Passage 95
The Relationship between Oral and Silent Reading 99

INDEX 105

LIST OF FIGURES

FIGURES PAGE
1. Average Eye-Voice Span by Grades—Elementary Subjects . . 18
2. Average Eye-Voice Span by Grades—High-School Subjects . . 33
3. Development of Eye-Voice Span—All Subjects 40
4. Average Eye-Voice Span by Position in Sentence—Elementary Subjects 43
5. Average Eye-Voice Span by Position in Sentence—High-School Subjects 47
6. Average Eye-Voice Span at the Beginning, Within, and at the End of Sentence—All Subjects 49
7. Relation of Eye-Voice Span to Reading Rate—Elementary Subjects 52
8. Relation of Eye-Voice Span to Reading Rate—High-School Subjects 54
9. Relation of Eye-Voice Span to Reading Rate—All Subjects . . 55
10. Relation of Eye-Voice Span to Average Number of Fixations per Line—All Subjects 57
11. Relation of Eye-Voice Span to Eye-Movements-Just-Preceding-Regressive-Movements—All Subjects 61
12. Relation of Errors in Word Test Paragraph to Eye-Voice Span . 94
13. The Development of the Attention Span in Reading 100

LIST OF PLATES

PLATE PAGE

I. Location of Fixations from Film Record on Lines of Print, Subject H5 5

II. Selections Used for the Experiments 8

III. Eye-Voice Span of Subject E12, Poor Reader, Grade IV . 11

IV. Eye-Voice Span of Subject H2, Good Reader, Freshman . 12

IV*a*. Plate IV—*Continued* 13

V. Eye-Voice Span of Subject E2, Good Reader, Grade II . 20

VI. Eye-Voice Span of Subject E3, Poor Reader, Grade II . 21

VII. Eye-Voice Span of Subject E6, Good Reader, Grade III . 22

VIII. Eye-Voice Span of Subject E7, Poor Reader, Grade III . 23

IX. Eye-Voice Span of Subject E9, Good Reader, Grade IV . 25

X. Eye-Voice Span of Subject E13, Good Reader, Grade V . 26

XI. Eye-Voice Span of Subject E16, Poor Reader, Grade V . 27

XII. Eye-Voice Span of Subject E17, Good Reader, Grade VI . 28

XIII. Eye-Voice Span of Subject E19, Poor Reader, Grade VI . 29

XIV. Eye-Voice Span of Subject E22, Good Reader, Grade VII . 30

XV. Eye-Voice Span of Subject E24, Poor Reader, Grade VII . 31

XVI. Eye-Voice Span of Subject H6, Poor Reader, Freshman . 35

XVII. Eye-Voice Span of Subject H14, Good Reader, Junior . . 36

XVIII. Eye-Voice Span of Subject H16, Poor Reader, Junior . . 37

XIX. Eye-Voice Span of Subject H19, Good Reader, Senior . . 38

XX. Eye-Voice Span of Subject H24, Poor Reader, Senior . . 39

XXI. Continuous Eye-Voice Relationship, Subject H1 . . . 66

XXI*a*. Plate XXI—*Continued* 67

XXII. Continuous Eye-Voice Relationship, Subject H5 . . . 70

XXIII. Continuous Eye-Voice Relationship, Subject H8 . . . 71

XXIV. Continuous Eye-Voice Relationship, Subject H10 . . . 72

XXV. Continuous Eye-Voice Relationship, Subject H22 . . . 73

PLATE PAGE

XXVI. Continuous Eye-Voice Relationship, Subject H23 74

XXVII. Continuous Eye-Voice Relationship, Subject A3 . . . 75

XXVIII. Continuous Eye-Voice Relationship, Subject E1 . . . 76

XXIX. Continuous Eye-Voice Relationship, Subject E5 . . . 77

XXX. Effect of New and Difficult Words Upon Eye-Movements . 82

XXXI. Location of Long Fixation Pauses, 19 Subjects . . . 84

XXXI*a*. Plate XXXI—*Continued* 85

XXXII. Oral Reading of Test Passage by Subject H13 89

XXXIII. Oral Reading of Test Passage by Subject A1 90

XXXIV. Oral Reading of Test Passage by Subject A3 91

XXXV. Silent Reading of Test Passage by Subject H3 . . . 96

XXXVI. Silent Reading of Test Passage by Subject H7 . . . 97

XXXVII. Silent Reading of Test Passage by Subject A4 . . . 98

LIST OF TABLES

TABLE PAGE
I. General Data for Oral Reading—All Subjects 16
II. Average Eye-Voice Span by Grades—Elementary Subjects . . 17
III. Average Eye-Voice Span by Grades—High-School Subjects . 33
IV. Average Eye-Voice Span by Position in Sentence—Elementary Subjects 44
V. Average Eye-Voice Span by Position in Sentence—High-School Subjects 46
VI. Average Eye-Voice Span at the Beginning, Within, and at the End of Sentence—All Subjects 48
VII. Relation of Eye-Voice Span to Reading Rate—Elementary Subjects 52
VIII. Relation of Eye-Voice Span to Reading Rate—High-School Subjects 54
IX. Relation of Eye-Voice Span to Reading Rate—All Subjects . 55
X. Relation of Eye-Voice Span to Average Number of Fixations per Line—All Subjects 56
XI. Relation of Eye-Voice Span to Number of Regressive Movements per Line 58
XII. Relation of Eye-Voice Span to Eye-Movements-Just-Preceding-Regressive-Movements—All Subjects 61
XIII. Elasticity of Eye-Voice Span—Subject H1 78
XIV. Relation of Eye-Voice Span to Length of Fixations . . . 80
XV. Errors in Word Test Paragraph—Oral Reading 93
XVI. Relation of Errors in Word Test Paragraph to Eye-Voice Span . 94

CHAPTER I

INTRODUCTION

PROBLEM

In oral reading the eye always moves at a greater or less distance in advance of the voice. For a mature reader the eye leads the voice by a wide span, which at times amounts to as much as seven or eight words. The immature reader, however, such as a pupil in the primary grades, has a very narrow span. For such a reader the eye does not move from a word until the voice has spoken it, and reading in many cases consists merely of a series of spoken words. The eye-voice span, in that case, is reduced to a minimum. A simple experiment of placing a card over a printed page and uncovering only a word at a time will demonstrate the situation which would exist if the eye and voice were kept very close together. Interpretation of the passage is difficult under such conditions. An eye-voice span of considerable width is therefore necessary in order that the reader may have an intelligent grasp of the material read, and that he may read it with good expression. If words are encountered which are spelled alike but pronounced differently such as "read" (present tense) and "read" (past tense), the correct pronunciation and meaning cannot be determined in many cases until the eye has observed the context by looking ahead. A still further need for a wide eye-voice span is apparent when marks of punctuation are encountered. This need is well illustrated by the reading of children when they arrive at a question mark without having seen it in advance and find their vocal expression entirely unprepared for it. Their failure to respond with a rising inflection of the voice is clear evidence that they were not looking ahead and that they were not getting the thought in large units. The eye-voice span is of real significance, therefore, in the reading process. In the diagnosis of difficulties in reading a measure of the eye-voice span often affords a definite basis for treatment. Treatment not uncommonly involves the construction of definite methods of teaching which will serve to increase the width of the span. The purpose of this study is to determine more fully and accurately the nature of the eye-voice span.

The problem will be considered in three divisions. In the first (*a*) a study will be made of the differences in the width of the eye-voice span in the different grades and in the high school, and (*b*) the variation in the width of the span in different parts of the sentence. In both (*a*) and (*b*) the results will be presented in such a way as to show separately the characteristics of pupils with mature and immature reading habits. Following this, (*c*) a comparison will be made to show the relationship of the width of the eye-voice span to rate of reading, number of fixations per line, and regressive movements.

In the second division (*a*) a very detailed analysis of eye-voice relationship will be made, which will show the exact position of the eye and voice at each eye-fixation and will exhibit the variations in the width of the eye-voice span in the reading of different passages by a single individual. These results will be used (*b*) in an effort to explain the cause of the occasional very long eye-fixations which appear in reading records.

The third division of the investigation will make use of a test device, consisting of a paragraph containing several words spelled alike but pronounced differently, by which the eye-voice span in oral reading will be studied in relation to the recognition of meaning in silent reading.

PREVIOUS STUDIES

Previous to this time the subject of this investigation has appeared, so far as the writer can discover, only twice in the literature of experimental studies of reading. In 1897 Quantz[1] did some work on the problem without the use of elaborate apparatus. His experiment was carried out by quickly slipping a card over the page while the subject was reading and recording the number of words spoken after the view was cut off. The method gave results which, for two reasons, are not directly comparable with those of the present study. The first is that the method did not record the location of the eye's fixation at the instant the view was cut off, but recorded the number of words which could be correctly given. In ordinary reading material more words could be given than were actually seen, by simply filling out the content of the meaning. This would cause a considerable error in the results which might have been partly reduced by the use of non-sense material instead of the meaningful material used. The use of such material would, however, have introduced another difficulty due to the fact that non-sense material is not normal reading-matter. The method used by Quantz gave an apparently wider eye-voice span than actually existed. The second factor which would cause a difference in results from those of the present study is that by Quantz's method the number of words recorded would include all which were seen even to the limits of the perceptual area, while by the method of this investigation the location of the eye is recorded at a point within the fixation area. This again operates to give a wider span for Quantz's study.

---

[1] J. O. Quantz, "Problems in the Psychology of Reading," *Psychological Review Monograph Supplement*, Vol. II, No. 1. 1897. Pp. 1–51. Princeton, N.J.: Psychological Review Co.

Quantz computed the correlations between eye-voice span and rate of reading and between eye-voice span and the positions in the line. He found a high correlation between reading rate and the width of the eye-voice span. He also found that the span depended to a great extent upon the point in the line at which the view was cut off. He reports an average span of 7.4 words at the beginning of a line, 5.1 words in the middle, and 3.8 words at the end of the line.

The second reference which has been made to this problem is found in the study made by C. T. Gray[1] in 1917. Gray's report gave seven plates showing the readings of six subjects, one from the seventh grade, two from the high school, and three from college students. No detailed analysis of the records was made and no correlations were given, but his conclusions were summed up in the statement that "the separation between eye and voice in oral reading varies from individual to individual or from point to point within the same selection."

With the exception of these two brief references, no previous investigations appear in the literature canvassed by the writer.

APPARATUS AND METHOD OF PRESENT STUDY

The apparatus and general method of this investigation are the same as used by C. T. Gray and other investigators in the Chicago laboratory. They are fully described in Gray's[2] monograph. One change was made in the equipment there described. The hand-feed arc lamp was discarded and a new three-wire automatic arc was installed in its place. This lamp is automatically fed by a magnetic release and has the advantage of producing a beam of light of constant intensity and at a constant point of location.

Without describing the apparatus in detail, it may be well to describe in general the method of this investigation. It consists of photographing a beam of light, generated by the arc lamp, reflected first to the cornea of the eye from silvered glass mirrors, and then from the cornea through a camera lens to a moving film. The pencil of light changes its direction with each movement of the eye. The subject reads and a photograph is made on the film which records the movements of the eye

[1] C. T. Gray, "Types of Reading Ability as Exhibited through Tests and Laboratory Experiments," *Supplementary Educational Monographs*, Vol. I, No. 5. Chicago: University of Chicago Press, 1917. Pp. 106–20.

[2] *Ibid.*, pp. 83–90.

as a sharply focused line. An electrically driven tuning-fork, with a vibration rate of fifty times per second, is mounted in the path of the beam of light in such a way that the light is intercepted at each vibration. These vibrations produce on the film a line of dots rather than a solid line, each dot representing a time of exactly one-fiftieth of a second. Since the film is moved continuously in the vertical plane, the record shows a vertical line of dots while the eye is fixated in a single position, and a short horizontal line when the eye is in motion in a horizontal or oblique direction. Vertical movements of the eye are lost. A second line, the head-line, is obtained on the film by the reflection of the light from a bright nickel-plated bead fastened to the rim of a pair of spectacles worn by the reader. This line shows any head movement which may occur, and since it is impossible to eliminate all head movement, this line is of the greatest importance. Every eye-fixation is located with reference to the position of the head-line, and by this means correction is made for all head movement. This brief statement of apparatus and method may be supplemented by the very detailed explanation given in Gray's monograph.[1]

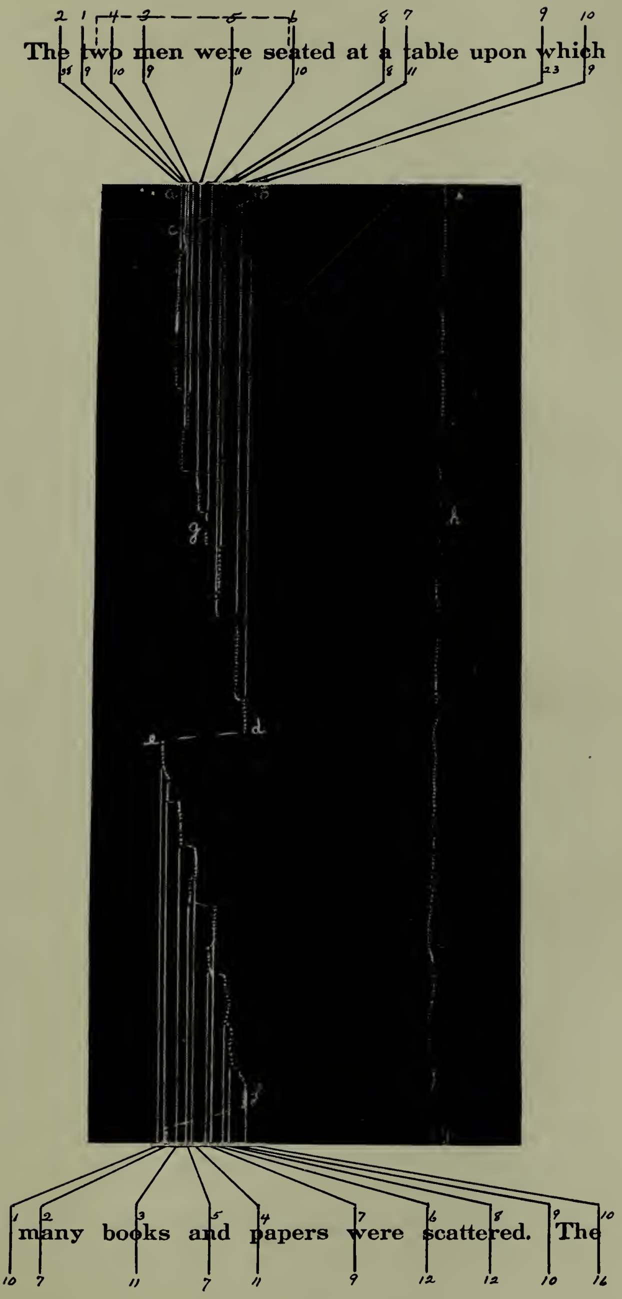
The method of determining the location of the fixations on the printed lines from the film record has not been adequately described in previous studies. This part of the technique is of sufficient importance to receive a careful explanation here. Plate I shows the film record for the first two lines read by Subject H5. On this plate, line *xy* is the head-line made by the reflection from the metal bead. The upper part of the line shows little head movement, but the lower part shows such movement very distinctly. Movements of the head such as occur at the lower part of the plate would cause an error in locating fixations of as much as four or five letters, if the head-line were not provided for correction. Many head movements, especially for children in the lower grades, are much greater than those shown by this subject.

The eye record made by the light reflected from the cornea is shown in the lines *cd* and *ef*. The line *cd* represents the reading of the first line of the paragraph, and the line *ef* the reading of the second. The vertical lines of dots show the fixations of the eye. The horizontal line *de* shows the movement of the eye from the end of the first line to the beginning of the second. Since each dot on the film represents one fiftieth of a second, this movement from line to line consumed two fiftieths of a second. By counting the dots it will be found that the last fixation of the first line took nine fiftieths of a second, and the one just before it, twenty-three fiftieths.

---

[1] C. T. Gray, *op. cit.*, pp. 86–90; 106–20.

PLATE I



Location of fixations from film record on lines of print, Subject H5

The points *a* and *b* on the plate are related to the printed matter read by having the reader fixate his eyes upon a dot placed just above the first letter of the first line, and then upon another dot just above the last letter of the line. The fixation for the first dot cannot be shown on this small section of the film, but the point *a* lies in the vertical extension of that fixation. The point *b* lies in the path of the fixation on the second dot, a few dots of the fixation showing just below *b*. The distance, therefore, from point *a* to point *b* equals the distance covered by a movement of the eyes from one end of a line of print to the other, and all fixation movements will fall on the film between lines extended vertically from these points. If the film were further enlarged until point *a* rests over the first letter of the first line and point *b* over the last letter, the vertical projections of the fixations would fall exactly over the letter upon which the eye was fixated at that time. For the first line shown in the plate, the first fixation would fall exactly over the first letter of the word "two"; the second fixation would fall exactly over the last letter of "the"; the third fixation would fall exactly over the first letter of "men"; etc. It was by this method that all of the films were translated into positions of the eye on the printed lines. The film was run through a stereoptican projection apparatus which enlarged the record on a screen until the points represented on the plate by *a* and *b* exactly coincided with the edges of the paragraph. The film was then wound through the stereopticon on a spool, and the location of each fixation marked on the letter over which it passed. The length of the fixation was recorded at the same time by counting the dots on the film. In Plate I, the fixations are connected by vertical extensions to the line connecting points *a* and *b*. The lines drawn from these projections to the words intersect the words at exactly the place where the fixations would be located if the film were enlarged until line *ab* was equal to the width of the printed line.

In order to get a record of the voice the photograph was supplemented by a dictaphone record of the oral reading taken for all subjects at the same time the photograph was made. The speaking tube of the dictaphone was placed directly in front of the reader's mouth. In order to record the exact relation to the eye-movements on the film, the speaking tube was divided, one section being attached to a box containing a tap-bell operated by an electric switch. This same switch also operates a camera shutter with its action reversed so that it is normally open instead of closed. The shutter is placed in the path of the beam of light in such a manner that when the switch is operated quickly the beam of light is shut off for an instant and the bell rings at the same time. The breaks in the photograph and the bell signal on the dictaphone record thus make it possible to synchronize the operations of the eye and voice. A typical interception on the film is shown in a short gap in the film line in Plate I, at point *g* on the eye-line and *h* on the head-line. The bell records a sharp click on the dictaphone wax record at the same time. In Plate I the break in the eye-line occurred during the sixth fixation at point *g*. This point on the printed copy falls on the third letter of the word "seated." The dictaphone recorded the click of the bell at the same time that the subject was pronouncing the word "two." This means that when the subject was pronouncing "two" his eye was fixated upon the word "seated." The interval from "two" to "seated," as marked on the plate by a dotted line, shows the distance that the eye was ahead of the voice. This is the interval spoken of as the eye-voice span. The eye-voice span could be determined at any desired place in the reading by simply pushing the switch key at the time the subject pronounced that particular word. This was done nine times in the reading of each elementary pupil, and eight times during the reading of each high-school pupil. The wax record gave a means of checking the movement to see if it occurred at exactly the place desired. If it should occur too soon or too late the dictaphone furnishes a means of correction.

SUBJECTS EXAMINED IN THE PRESENT STUDY

Photographs were taken of the readings of fifty-four different subjects selected as follows. Two good and two poor readers were selected from each of the elementary grades above the first, on the basis of scores made in William S. Gray's Oral Reading Paragraphs. Three good and three poor readers were selected through the co-operation of the English department and the high-school principal from each of the four high-school classes. Six adult college students were selected at random and ranked into two divisions, one better than the other. The three poorer adult subjects were, however, fairly good readers. The entire group of subjects, therefore, included twenty-four from the elementary school, twenty-four from the high school, and six college students, each grouping being made up of equal numbers of good and poor readers. Great care was used in the selection of these groups in order that all the characteristics of the subjects might be known in advance so as to clear the way for concentration of attention during the investigation on the one matter of the eye-voice span. The reading rate of all subjects was taken at the time of the experiment, using material of the same degree of difficulty as that used for the photograph.

PLATE II

The kitten pulled at the veil and wreath of flowers with her cunning paws. Little by little she drew them to the edge of the box. At last she poked her head right through the wreath, but she couldn't get it out again.

The two men were seated at a table upon which many books and papers were scattered. The older man turned to a page in a large book and began to read. The subject of the chapter was something about hypnagogic hallucinations and hyperaesthesia. A few pages further on he came to a sentence which read, "One thing, however, is obvious, namely, that the manner in which we become acquainted with complex objects need not in the least resemble the manner in which the original elements of our consciousness grew up."

Selections used for the experiments

CHAPTER II

THE EYE-VOICE SPAN

DETAILED STATEMENT OF METHOD

Units of measure.—Throughout the study the unit of time measure is one-fiftieth of a second, corresponding to the vibration rate of the tuning-fork time-marker. In all of the plates shown the length of fixations is given by the row of figures beneath the printed line, and is recorded in units of fiftieths of a second.

The unit of measure for the width of the eye-voice span is one letter-space. The term "letter-space" may be defined as the space taken by one letter or one punctuation mark, or the blank space between words. This unit is an arbitrary one, but is constant throughout the study. For the selections used the average number of letter-spaces per word is five. Therefore the denomination of any of the results may be transposed from letter-space units to word units by dividing by five.

Reading selections used.—The reading selections used for this part of the study are reproduced in Plate II in the same form and size of type as used in the experiment. The upper selection, taken from one of the Courtis silent-reading tests,[1] was read by the pupils selected from the elementary grades. This paragraph was chosen because it was desirable to use a selection which was not too difficult for second-grade children, but could be used also for the pupils of the five higher grades. The paragraph was found to be well adapted to this purpose. The selection used for the elementary pupils was necessarily shorter than that used for high-school students, since the younger children read more slowly and the time for taking the photograph was limited by the length of the film. The films used were forty-two inches long, and in passing through the camera allowed fifty seconds of reading time. The elementary pupils were directed to "read naturally just as you would if you were reading in class for your teacher." From all objective evidence the pupils did read naturally and were not disturbed by the apparatus. The subjects from the second grade carried out the experiment fully as well as those from the higher classes. When the subjects began to read they apparently forgot about the apparatus and centered all their attention upon the reading.

---

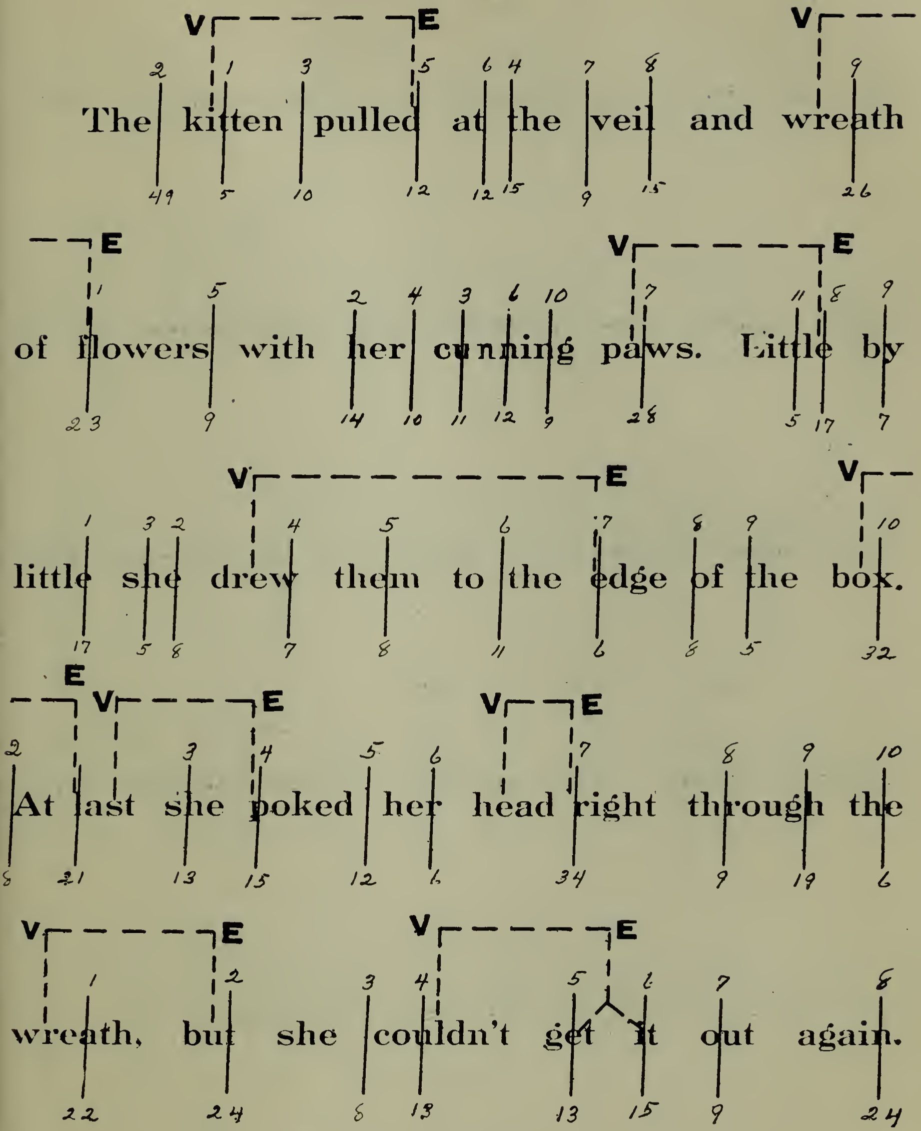
[1] S. A. Courtis, "The Kitten Who Played May-Queen," Silent-Reading Test No. II, Form I. *Standard Research Tests.* Detroit: S. A. Courtis.

The selection shown in the lower part of Plate II was used for the high-school and college students. It was constructed with three purposes in mind. The first aim was to provide a few lines of easy, normal reading-matter. The first four lines provide this. The second purpose was to introduce a few new and difficult words to find the reaction to that kind of a situation. The three words in lines five and six were therefore introduced, and were found to be new to all of the high-school subjects. The third aim was to introduce a sentence made up of easy words but containing a difficult thought. The last sentence in the paragraph taken from James' *Principles of Psychology*, satisfied this requirement. The subjects were directed to "read the paragraph naturally, just as you would a newspaper. If you meet any new or difficult words, pronounce them the best you can and go on. Try to remember the thought well enough so you could tell what you have read if asked to do so." The introduction of the three difficult words in lines five and six caused such a disturbance of the eye-movements that the results for these two lines are entirely omitted in the table of general data and in all general averages given throughout the study. The difficulties encountered will, however, be given special treatment in the next chapter.

Explanation of typical records.—In order that the discussion in this report may be more easily followed, a detailed explanation of the plates of two typical subjects will be given here. Plate III shows such a record from a pupil belonging to the elementary school and Plate IV, one from a student in the high school.

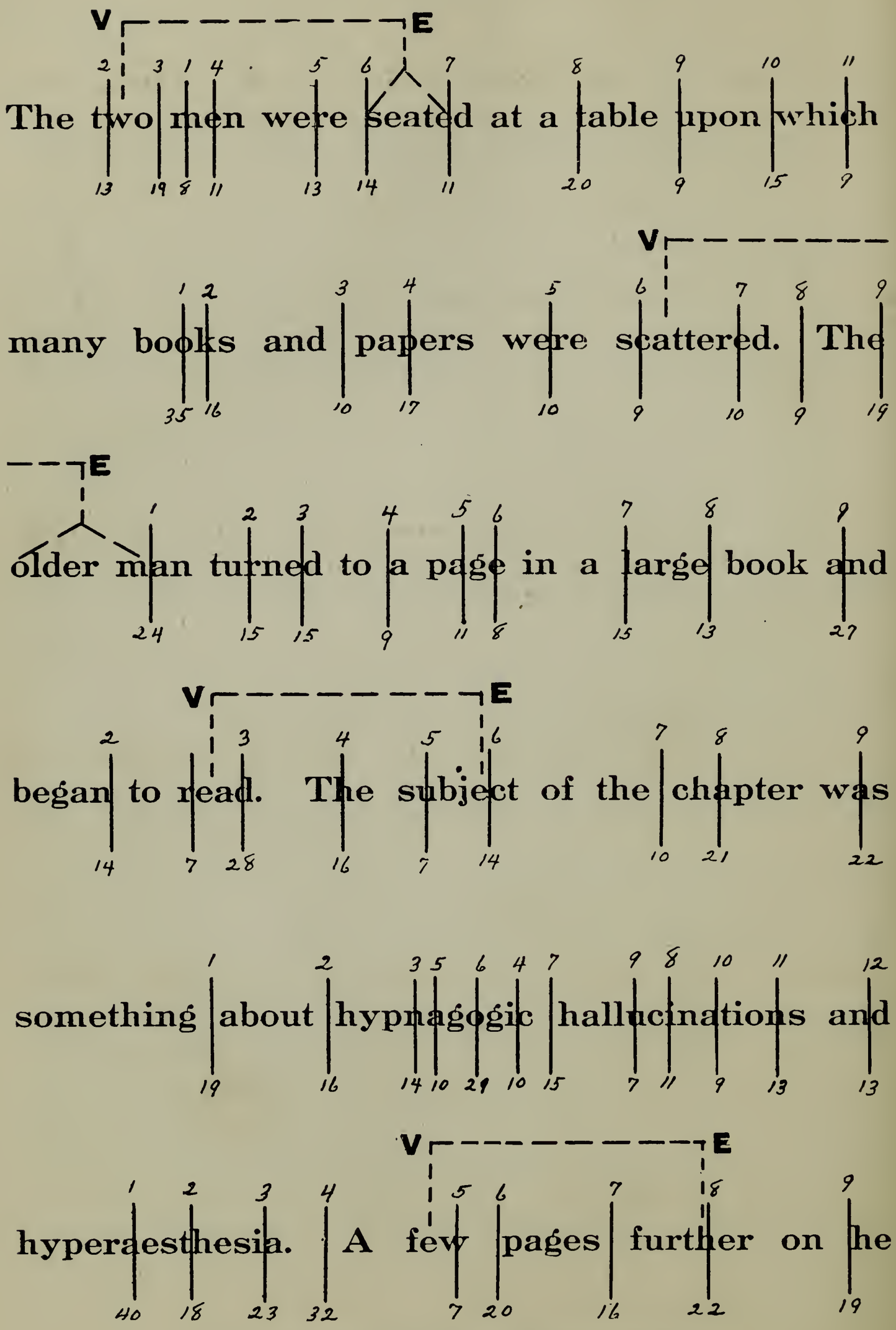
Plate III shows the oral reading of a poor reader from the fourth grade. The short vertical lines drawn through the words indicate the points of eye fixations. The serial numbers above the vertical lines indicate the order of the fixations, while the numbers at the lower end of the lines indicate the lengths of the fixations in fiftieths of a second. Referring to the first line of this plate it will be seen that the first fixation fell upon the word "kitten" and that the eye remained there for five fiftieths of a second. The subject evidently did not feel sure of the beginning of the line, as indicated by the position of the second fixation which fell just after the first word of the line. The eye remained fixed at this point for forty-nine fiftieths of a second. The third fixation was located just before the third word and lasted for ten fiftieths of a second. The succeeding fixations may be observed by following the upper series

PLATE III


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

Eye-voice span of Subject E12, poor reader, Grade IV

PLATE IV



Eye-voice span of Subject H2, good reader, freshman

PLATE IV*a*

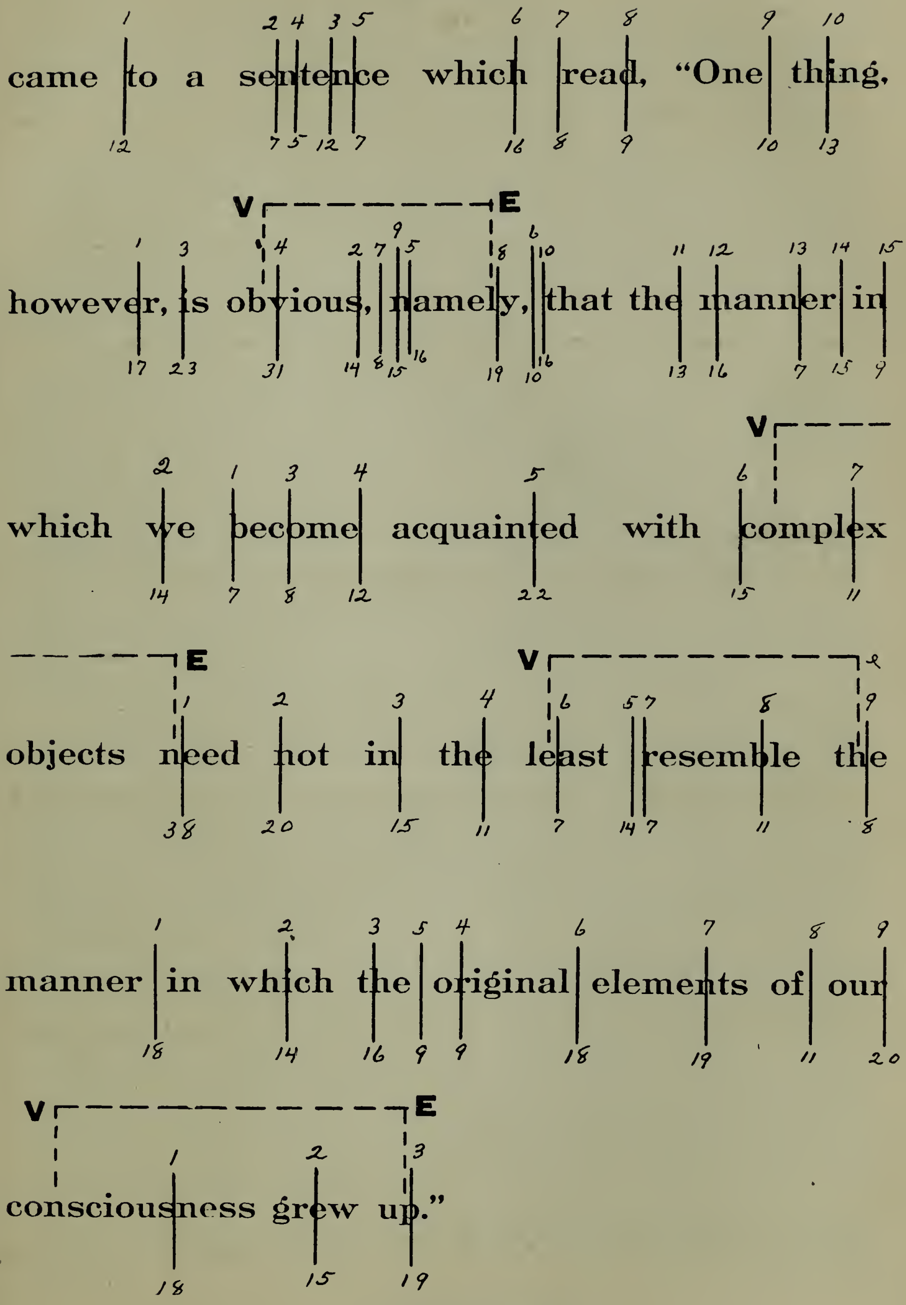


Plate IV—*Continued*

of numbers in order. The function of this investigation is concerned with the eye-voice span rather than with the nature of these fixation pauses. A very thorough analysis and interpretation of eye-movements and fixations in reading have been made in another monograph of this series.[1]

The eye-voice separation is shown, for several typical positions, in Plate III by a bracket of broken lines. The position of the voice is marked by the letter *V* and the position of the eye, by the letter *E*. Referring to the first line of this plate, it will be seen that when the voice was pronouncing the word "kitten" the eye was fixated on the last letter of the third word. If the number of letter-spaces included in the bracket connecting the positions of the voice and eye are counted, it will be found that the eye-voice span at this position is 11 letter-spaces. The eye-voice span was next measured at the end of the first line. As the voice was pronouncing the first part of the word "wreath," the eye was fixated on the first letter of the word "flowers" in the next line, making an eye-voice span of 8 letter-spaces plus the time consumed in moving back to the beginning of the line. Likewise, when the voice was pronouncing "paws" the eye was fixated on the last letter of "little," making a span of 9 letter-spaces. In the last line of Plate III the voice was pronouncing the word "couldn't" just as the eye was moving from the fifth to the sixth fixation. This occurred frequently, and in such cases the span was measured from the position of the voice to a point half-way between the two eye fixations, as shown by the branching of one arm of the bracket in this case.

As explained in the preceding chapter, the operation by which the positions of the eye and voice were determined was controlled by an electric switch. It was therefore possible to measure with exactness the eye-voice span at any desired position in the paragraph by simply pressing the connection at that point in the reading. For the sake of comparisons, nine positions were selected in the passage read by elementary pupils. These positions are shown in Plate III by the letter *V*, at the beginning of the brackets, which occurs just above the word which was being spoken at the time the measure was taken. These positions, in order through the elementary selection, occurred at the words "kitten" and "wreath" in line 1, "paws" in line 2, "drew" and "box" in line 3, "last" and "head" in line 4, and "wreath" and

---

[1] C. H. Judd and others, "Reading: Its Nature and Development," *Supplementary Educational Monographs*, Vol. II, No. 4. Chicago: University of Chicago Press, 1918.

"couldn't" in line 5. In general, the measure was taken at the time the voice was pronouncing the first part of the word. Any variations from this were checked and corrected by means of the dictaphone record. Two of these positions occur at the beginning of a sentence, five within a sentence, and two at the end of a sentence. Also, three occur at the beginning of a line, four near the middle of a line, and two at the end of a line. The location of the positions of measurement in this way makes possible not only an analysis of the eye-voice span by positions, but also makes a uniform distribution from which the average span can be regarded as representative of the paragraph as a whole.

Plate IV gives a typical reading by a high-school pupil. The plate shows the oral reading of Subject H2, a good reader from the freshman class. The method of indicating fixation and eye-voice span is the same as just described for Plate III. In this paragraph eight positions were selected for measuring the eye-voice span. These positions, in order through the paragraph, occurred at the word "two" in line 1, "scattered" in line 2, "read" in line 4, "few" in line 6, "obvious" in line 8, "complex" in line 9, "least" in line 10, and "consciousness" in line 12. Two positions occurred at the beginning of a sentence, three within a sentence, and three at or near the end of a sentence. The positions are also distributed according to position in the line.

A question may arise here whether an average eye-voice span, computed from eight or nine positions in a paragraph, is an adequate measure of the general character of the span for every word in the whole paragraph. In chapter iii of this report, a complete analysis showing the eye-voice span at every word and every fixation in the selection will be given, and a comparison will be made with the results obtained from the eight and nine position measures. The comparison shows a small variation in the average span obtained by the two methods.

Table of general data.—In Table I the general data for all subjects are shown. The elementary subjects' numbers are given the prefix E, the high-school subjects H, and the adult college students A. The table gives the subject number, school grade, quality of reading, average eye-voice span, average variation from the average, average number of fixations per line, average number of regressive movements per line, and rate of reading in number of words read per second. This table is intended only for general reference, summaries being given in later tables. It is analyzed in detail throughout the remainder of this chapter.

TABLE I

General Data for Oral Reading—All Subjects*

Subject	Grade	Quality	Average Eye-Voice Span	Average Variation	Average Number Fixations per Line	Average Number Regressive Movements per Line	Rate of Words per Second
E1	II	G	11.8	2.5	10.8	3.0	2.5
E2	II	G	10.3	3.9	9.0	1.8	2.5
E3	II	P	3.4	1.1	18.6	5.8	0.3
E4	II	P	7.4	4.1	12.0	3.4	1.0
E5	III	G	12.7	2.8	9.4	1.1	2.2
E6	III	G	13.7	2.6	9.0	3.1	3.6
E7	III	P	8.0	2.8	19.7	5.5	2.1
E8	III	P	12.6	3.6	14.0	2.6	2.3
E9	IV	G	11.1	5.0	7.8	1.0	3.3
E10	IV	G	16.6	7.5	7.5	1.2	4.0
E11	IV	P	4.0	1.4	11.2	1.2	1.3
E12	IV	P	8.2	2.3	9.4	1.4	3.4
E13	V	G	19.7	3.3	6.8	1.6	3.7
E14	V	G	13.9	5.0	9.6	1.4	2.5
E15	V	P	12.4	4.8	9.2	1.2	2.8
E16	V	P	7.0	2.6	11.8	3.2	3.4
E17	VI	G	14.9	4.1	8.4	2.0	3.7
E18	VI	G	8.9	4.4	7.0	1.4	4.0
E19	VI	P	8.0	1.5	9.4	2.0	3.2
E20	VI	P	14.4	2.5	7.0	1.2	2.0
E21	VII	G	12.0	4.3	8.2	0.8	4.2
E22	VII	G	19.7	3.4	7.6	1.0	3.5
E23	VII	P	11.4	4.2	8.4	1.8	3.1
E24	VII	P	7.3	2.3	12.2	3.0	2.9
H1	F	G	19.8	4.6	7.7	2.1	3.9
H2	F	G	14.2	1.5	9.6	1.0	3.3
H3	F	G	13.3	1.1	7.9	1.4	4.4
H4	F	P	10.0	0.7	10.0	2.2	2.9
H5	F	P	12.0	2.0	10.5	1.9	3.6
H6	F	P	12.4	3.5	11.9	2.4	3.4
H7	So	G	12.0	5.2	8.3	1.5	3.9
H8	So	G	15.5	5.0	8.1	1.6	3.5
H9	So	G	16.0	4.7	7.2	0.2	3.9
H10	So	P	14.1	3.3	8.3	1.5	4.4
H11	So	P	9.6	2.5	9.2	1.4	3.6
H12	So	P	13.8	2.0	8.3	1.3	3.9
H13	J	G	13.8	2.9	6.4	0.4	4.6
H14	J	G	17.7	4.2	8.1	1.6	4.2
H15	J	G	12.3	1.9	10.9	2.3	3.2
H16	J	P	8.5	2.4	9.8	1.2	4.5
H17	J	P	4.7	2.0	9.3	2.0	3.3
H18	J	P	11.5	0.5	10.7	0.9	3.7
H19	Se	G	12.8	3.5	7.4	0.2	4.3
H20	Se	G	23.0	7.0	9.9	1.3	4.8
H21	Se	G	12.0	3.3	9.9	0.7	3.4
H22	Se	P	13.9	3.6	10.7	3.2	3.7
H23	Se	P	10.8	1.3	10.7	1.2	3.4
H24	Se	P	12.4	2.9	7.5	1.5	3.9
A1	C	P	12.2	1.1	8.3	1.4	3.6
A2	C	P	9.3	4.4	9.7	1.0	3.9
A3	C	P	13.6	3.7	8.9	1.3	3.9
A4	C	G	17.8	4.3	9.0	2.0	4.4
A5	C	G	20.3	0.9	9.2	2.5	4.2
A6	C	G	18.6	1.8	6.4	0.4	3.6

* Lines 5 and 6 omitted in high-school and adult averages. G = Good; P = Poor.

ANALYSIS OF EYE-VOICE SPAN

An interpretation of the significance of the variations in eye-voice span can best be made by studying the relationships between these variations and other known factors of the reading process. A large amount of valuable information has been developed in recent years concerning reading rate and quality, and the characteristics of eye-movements and fixations. A correlation of the eye-voice span with some of the known factors will determine which types of eye-voice separation are indicative of mature and of immature reading habits. Accordingly, an analysis of the eye-voice span will be made showing correlations (*a*) with quality of reading throughout the school period, (*b*) with various positions in the sentence, (*c*) with reading rate, (*d*) with the number of fixations, and (*e*) with regressive movements. After such an analysis the significance of the eye-voice span can be more definitely stated.

Relation to quality of reading throughout the school grades.—The subjects for this experiment were carefully selected, as stated in an earlier paragraph, on the basis of quality of reading, making two equal groups, one composed of good readers and the other of poor readers. By comparing the average eye-voice spans of these two groups the correlation with quality of reading becomes apparent. The subjects were also selected from each elementary grade above the second and from each high-school class. The purpose of this method of selection was to make possible a study of the development of the eye-voice span through the grades. Table II shows the average eye-voice span of twenty-four elementary pupils by school grades and also by quality of reading. Figure 1 expresses the same facts graphically. The table shows the average eye-voice span for all the good readers to be 13.8 letter-spaces, for the poor readers 8.7 letter-spaces, and for the whole group of 24 pupils taken together 11.3 letter-spaces. The superiority of the good

TABLE II

AVERAGE EYE-VOICE SPAN BY GRADES—ELEMENTARY SUBJECTS

SUBJECTS	GRADE						AVERAGE FOR ALL GRADES
	II	III	IV	V	VI	VII	
Good readers	11.0	13.2	13.9	16.8	11.9	15.9	13.8
Poor readers	5.4	10.3	6.1	9.7	11.2	9.4	8.7
Good and poor . . .	8.2	11.8	10.0	13.3	11.6	12.7	11.3

readers in width of eye-voice span is very great, the average for all grades being 58 per cent wider than that of the poor readers. The average span of the good readers is also wider than that of the poor readers in every grade, being greater by 103 per cent in the second grade, 28 per cent in the third grade, 127 per cent in the fourth grade, 73 per cent in the fifth, 6 per cent in the sixth, and 69 per cent in the seventh. These results make it perfectly clear that for elementary pupils a wide eye-voice span is a factor of good reading and a narrow span is a factor of poor reading. Whether this factor is in the nature of a cause or an effect will be considered later.

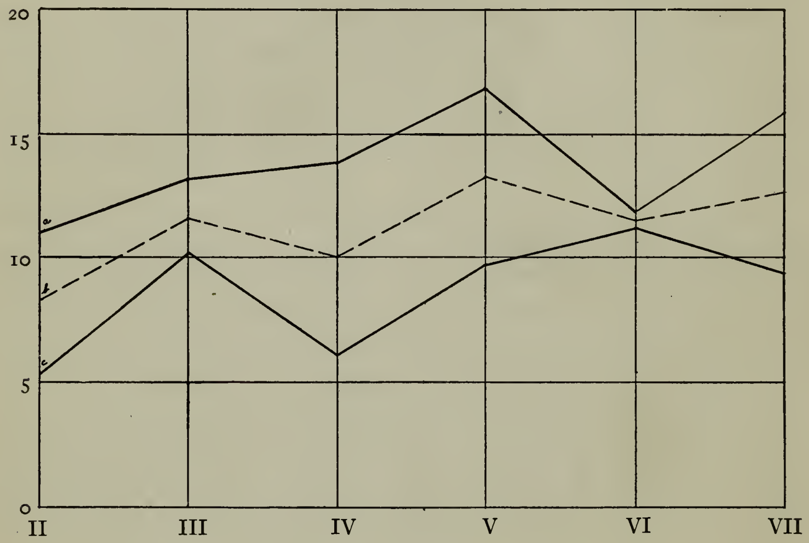


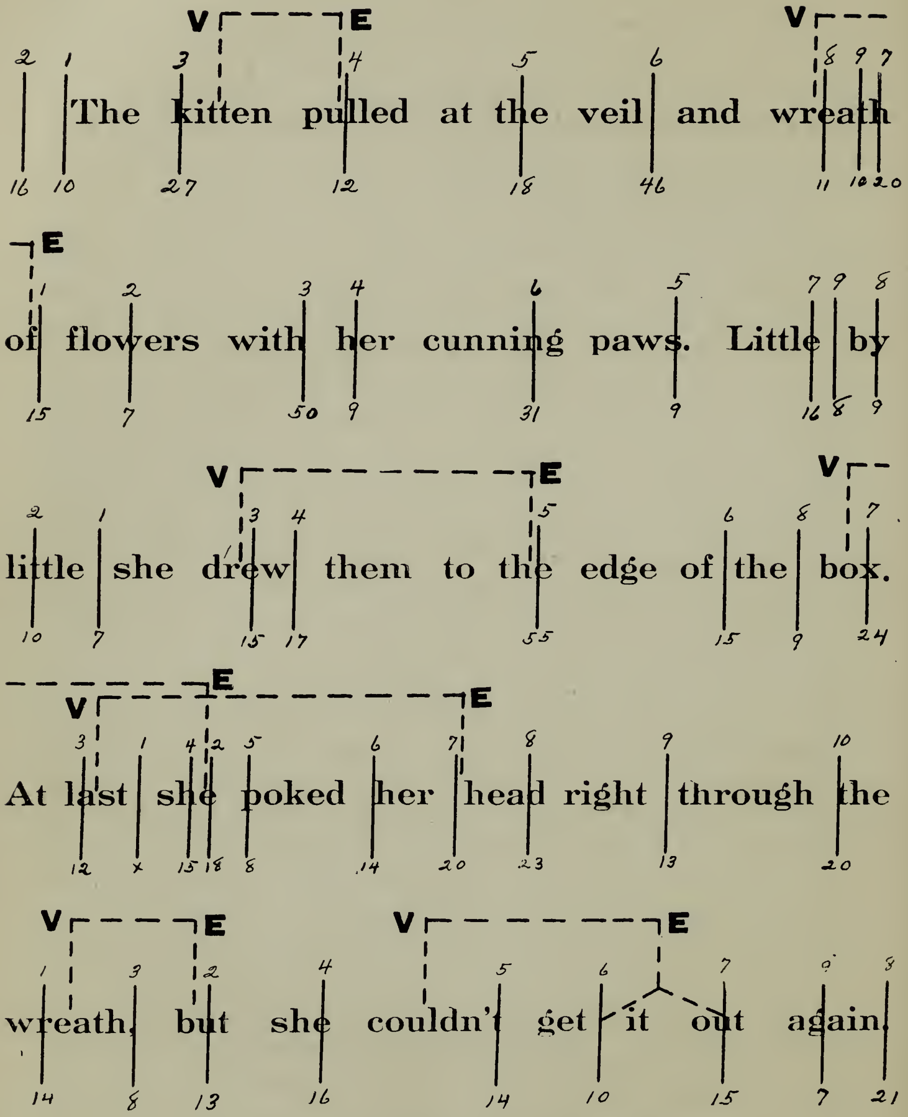
Fig. 1.—Average eye-voice span by grades—elementary subjects. The grades are shown on the horizontal axis. The width of the eye-voice span in letter-spaces is shown on the vertical axis.

A development in the width of the eye-voice span through the grades is also shown by Table II and Figure 1. Following the upper line in Figure 1, for the good readers, the progress shows a general upward direction until the sixth grade is reached, where a sudden drop occurs. This drop is apparently due to a very extreme variation in a single individual rather than to a characteristic of the grade in general. Subject E18, who was a good reader in the sixth grade, had an average eye-voice span which was lower than that of any other good reader, even those in the second grade. The low average of the good readers for this grade is due to this exceptionally narrow span. This subject showed all the other characteristics of a good reader, and no explanation appeared, as far as could be discovered, for the very narrow span except that it was an extreme individual variation. The development of the span through the grades for both good and poor readers was irregular, but a general upward tendency of the line is noticeable. Evidently this development is interfered with in the training of some pupils.

Plates III and V–XV show the readings of one good and one poor reader from each of the elementary grades. A study of some of these individual records will reveal many characteristic variations in oral reading. Plates V and VI give the readings of a good and a poor reader from the second grade. Subject E2, the good reader, has an average span of 10.3 letter-spaces. The width of the span in the two positions measured in the first line is much narrower than in the positions in the third and fourth lines. Such a variation for a subject, within a selection, is a characteristic in some degree of all readers. Plate VI shows the reading of Subject E3, a second-grade pupil and the poorest reader tested. The whole character of his eye-movements is different from that of E2. The average eye-voice span of E3 is only 3.4 letter-spaces. In the first line for the second word there was no span at all, the eye being fixated upon the word "kitten" at the same time it was being spoken. At the beginning of the fourth line a span of only 3 letter-spaces is found. The dictaphone record showed that this subject did not know all of the words of the selection and had not mastered his phonics sufficiently to help himself. Several words were apparently spelled out before they were pronounced. It is plainly evident that reading for this subject was little more than pronouncing a series of words. He was unable to look ahead of his voice and therefore had no means of grasping the meaning of a sentence in more than word units. This was a very extreme case which should doubtless receive special treatment.

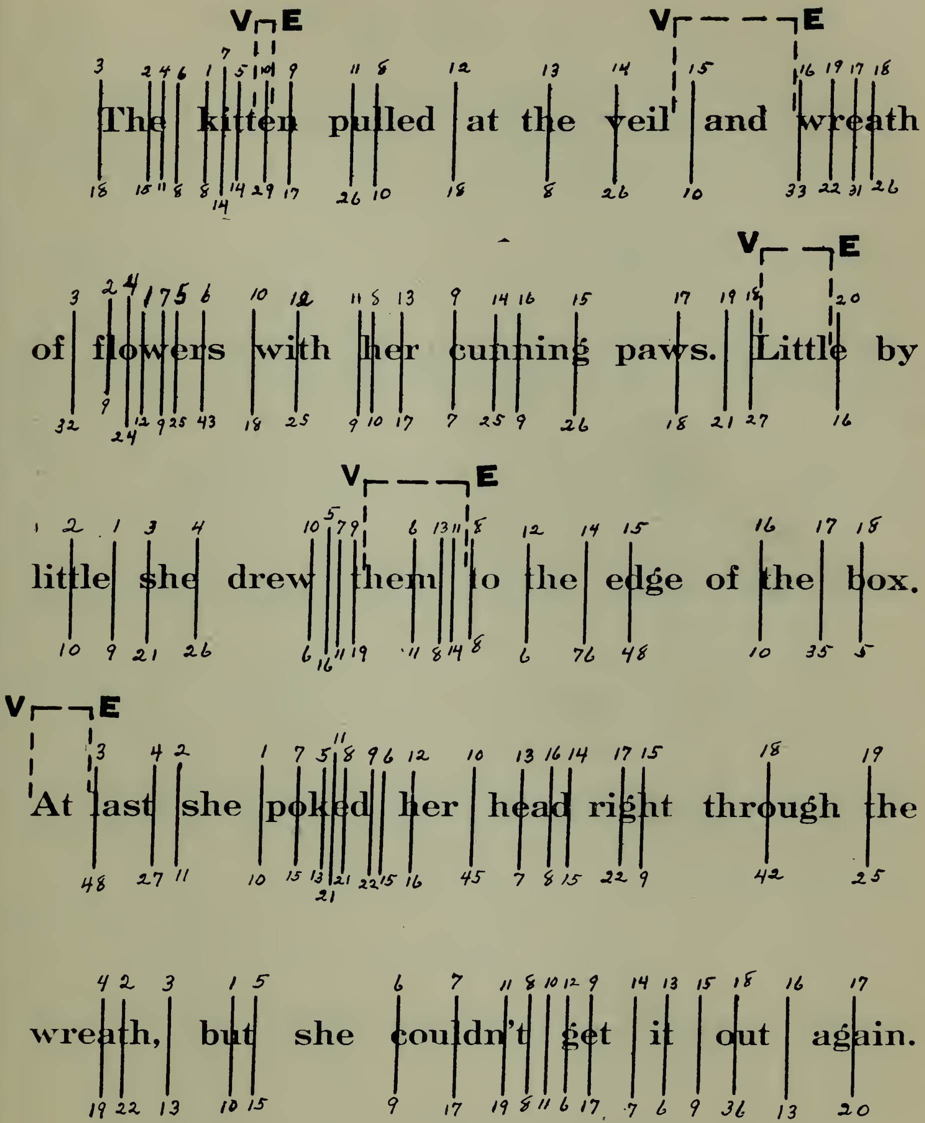
Plates VII and VIII show the records of a good and a poor reader from the third grade. The good reader, Subject E6, has an average span of 13.7 letter-spaces. In line 3 there was a large span of 20 letter-spaces. Subject E7, the poor reader, was a very active and talkative boy when not engaged in reading. He read as if the whole process were a bore to him and gave clear evidence that he did not hold the ability to read well in very high esteem. He had a very difficult time stumbling through the first line, making 29 fixations in the process. His average

PLATE V


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

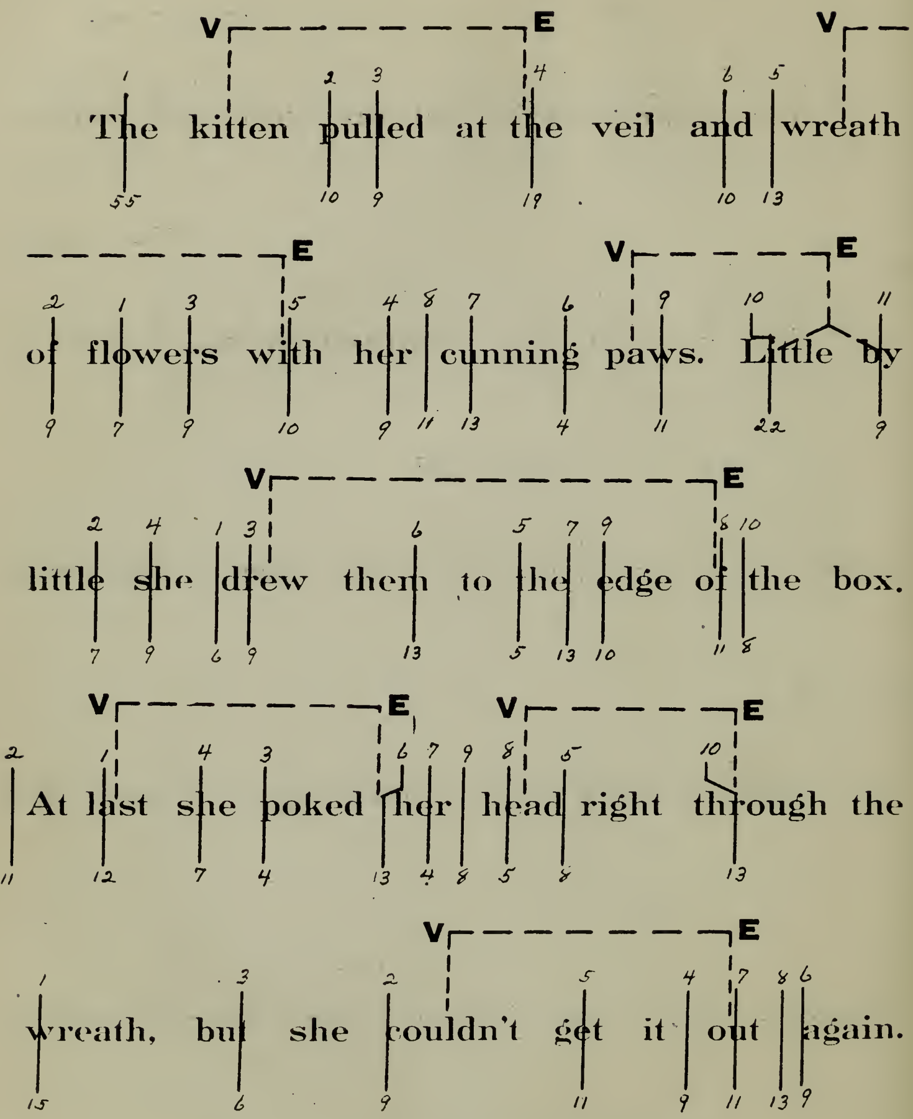
Eye-voice span of Subject E2, good reader, Grade II

PLATE VI


V E
The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.

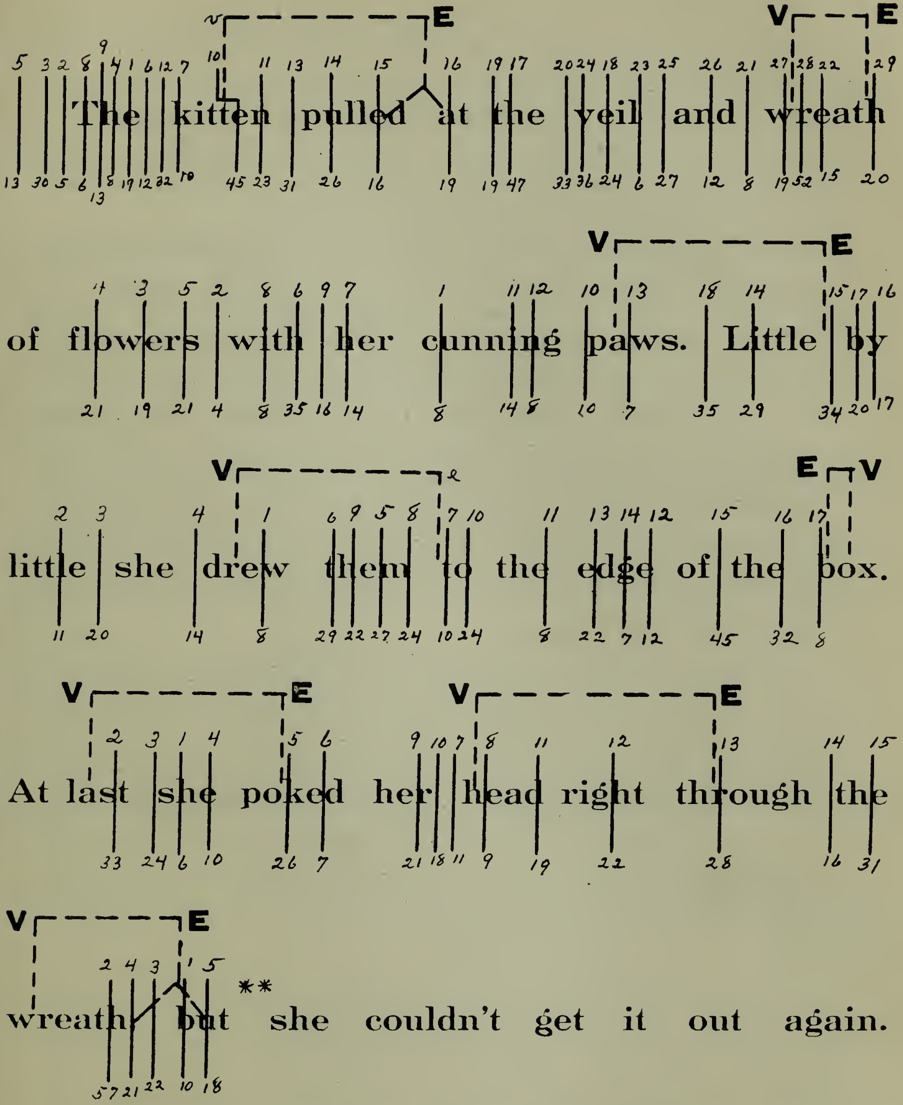
Eye-voice span of Subject E3, poor reader, Grade II

PLATE VII


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

Eye-voice span of Subject E6, good reader, Grade III

PLATE VIII


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath but ** she couldn't get it out again.
V
E

Eye-voice span of Subject E7, poor reader, Grade III. (**—end of film) eye-voice span was 8 letter-spaces. On the word "box" in the third line his span was reduced to zero.

Plate IX shows the record of a good reader in the fourth grade. That of the poor reader from this grade was given in Plate III. The good reader, Subject E9, had an eye-voice span of 11.1 letter-spaces. His record shows a distinct difference in the length of the span at the ends of the first two sentences, on the words "paws" and "box." These relatively shorter spans on the last word of a sentence are much more noticeable with a good reader than with a poor one.

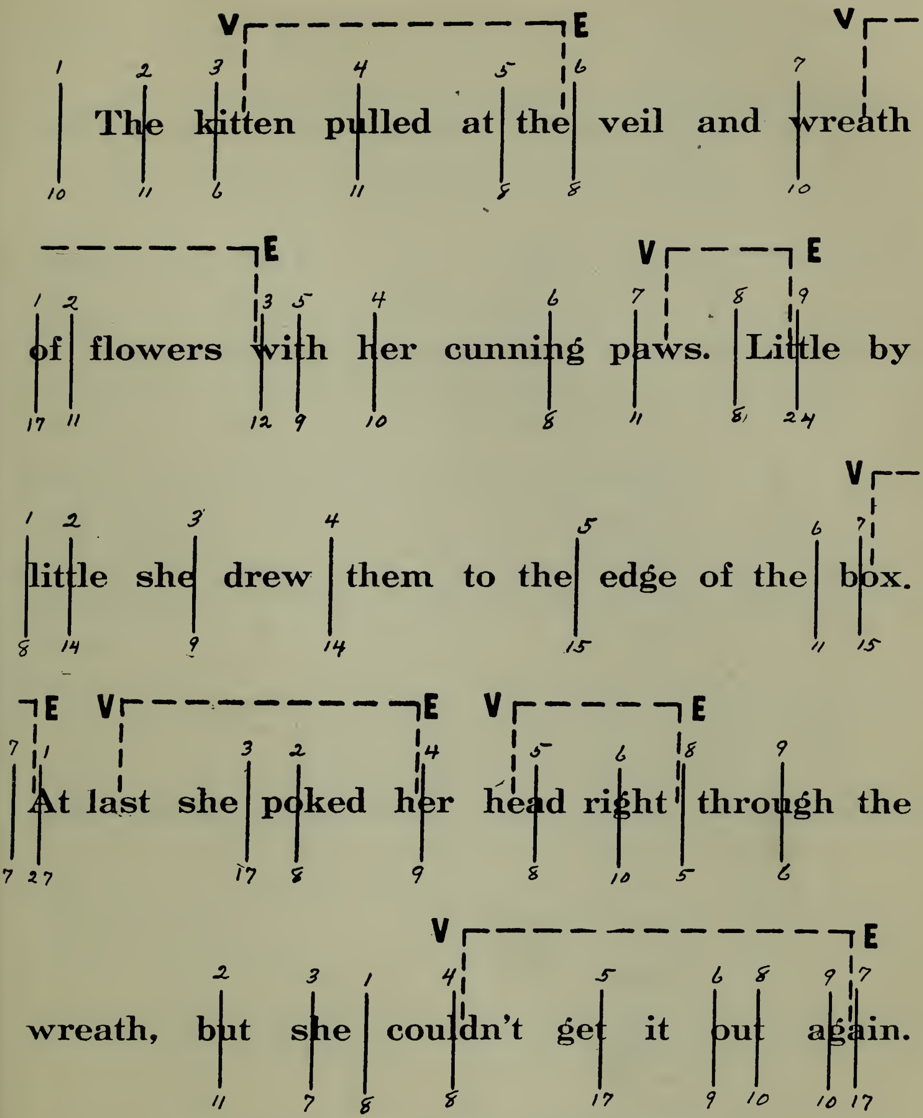
Plate X shows the record of a good reader from the fifth grade, who has an exceptionally wide eye-voice span which averages 19.7 letter-spaces. When this subject was pronouncing the word "head" in the fourth line, the eye was fixated just after the word "wreath" in the last line, making a span of 26 letter-spaces. Such a wide eye-voice span gives the reader a large opportunity to anticipate and interpret the meaning of the sentence in large units, and allows a much more expressive oral presentation than could be given without such a wide span.

Plate XI shows the record of a poor reader from this same grade, with an average span of only 7 letter-spaces. A comparison of these two records will readily show the handicap under which a person with a short span reads.

Plates XIV and XV show the wide variation in the reading of two seventh-grade pupils. Subject E22, in Plate XIV, has an average eye-voice span of 19.7 letter-spaces. The second fixation in the last line of this plate shows a type of eye-movement which occurs frequently in the reading of all subjects. It will be noticed that the first fixation falls upon the first word of the line, while the second appears to fall just before the last word. A careful examination of the film shows that an upward movement of the eye was made between fixations 1 and 2 and that the eye was really refixated upon the latter part of the preceding line.

Since the film passed through the camera in the vertical plane, the vertical movements of the eye would not appear directly. The method of determining an upward movement of the eye in this case needs further explanation. The film passed through the camera in a downward direction. A horizontal eye movement from the end of one line to the beginning of the next would appear as an oblique line, due to the fact that the eye moves *down* to the next line while the film is also moving in the same direction. If the eye moved from one end of a line to the other end of the same line, the degree of obliqueness would be less

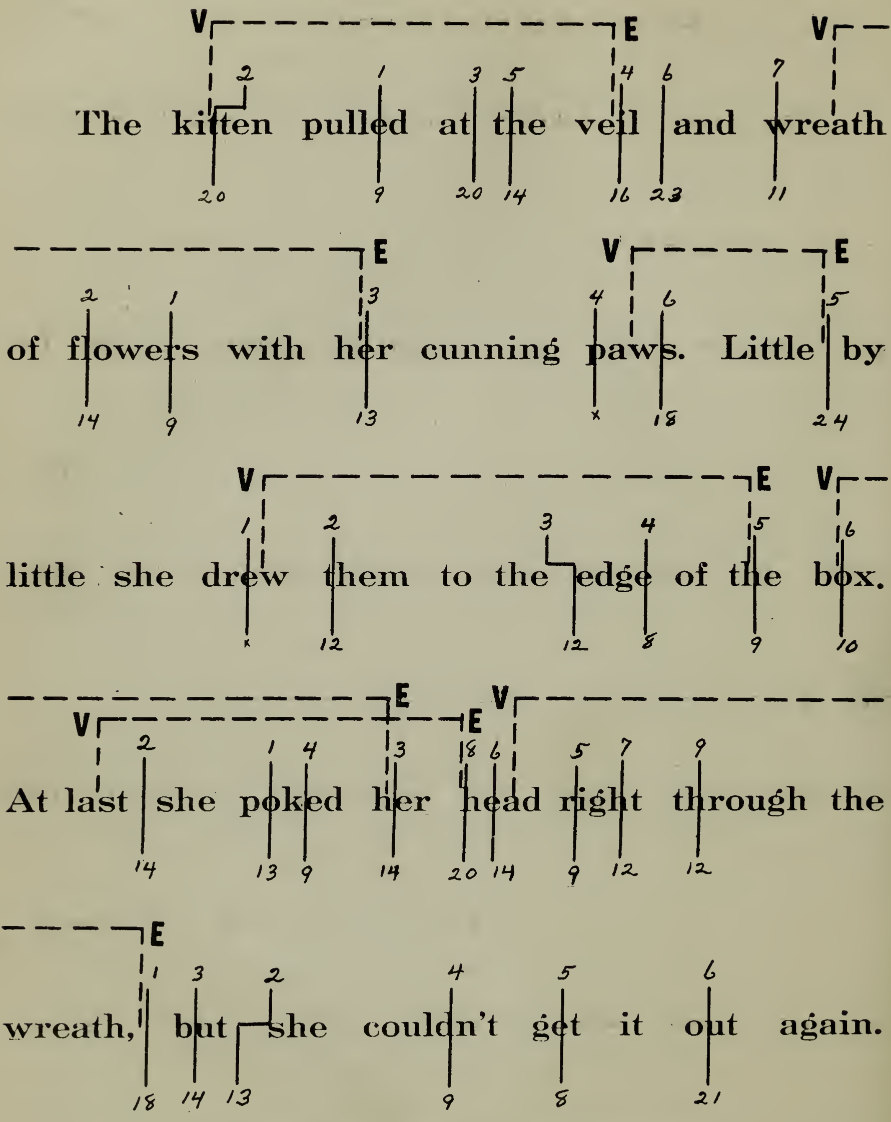
PLATE IX



The kitten pulled at the veil and wreath of flowers with her cunning paws. Little by little she drew them to the edge of the box. At last she poked her head right through the wreath, but she couldn't get it out again.

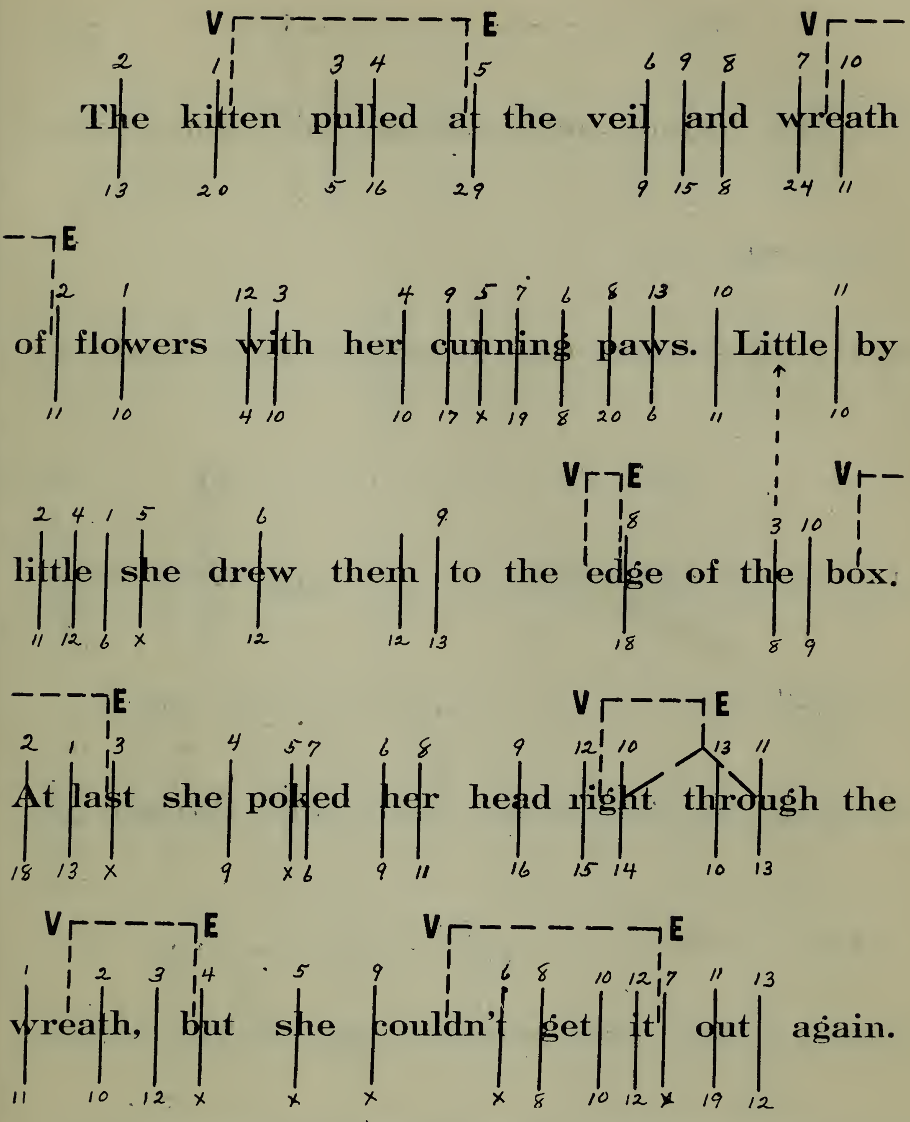
Eye-voice span of Subject E9, good reader, Grade IV

PLATE X


V
E
The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.

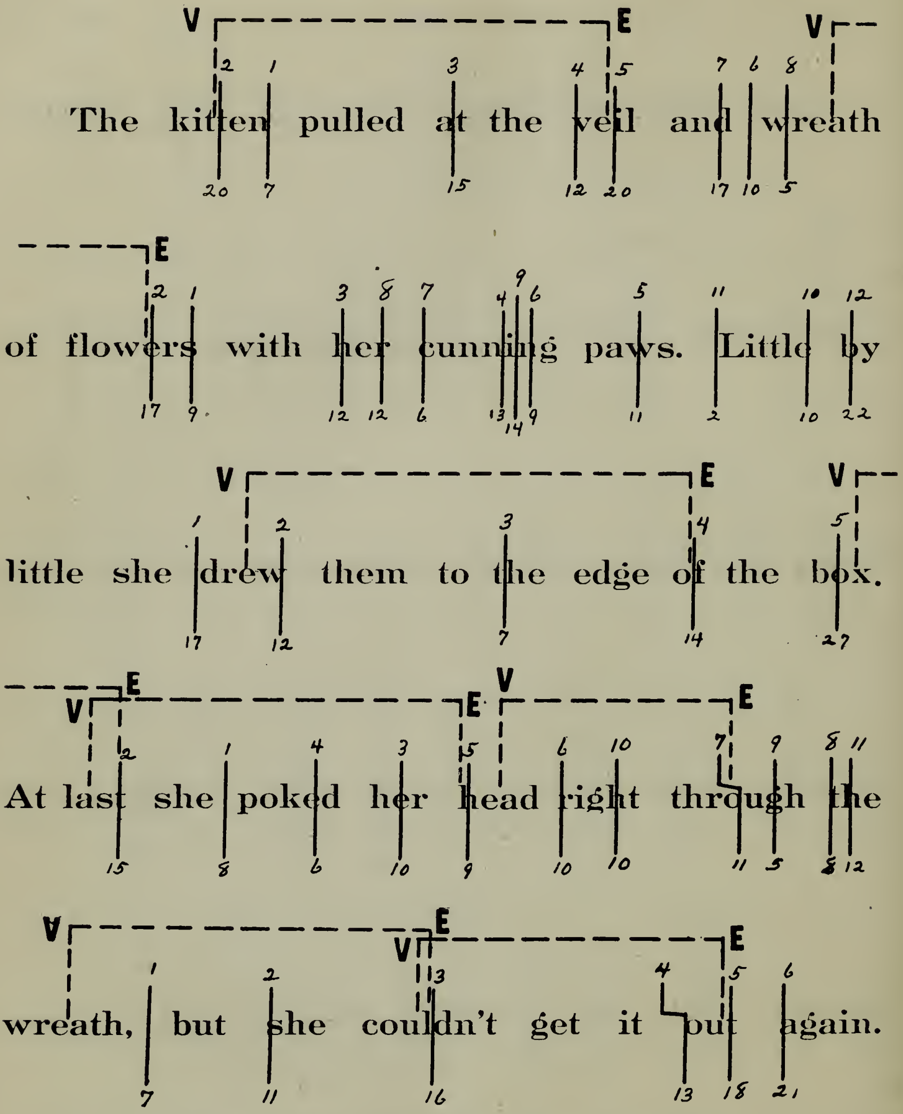
Eye-voice span of Subject E13, good reader, Grade V

PLATE XI


V
E
The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.

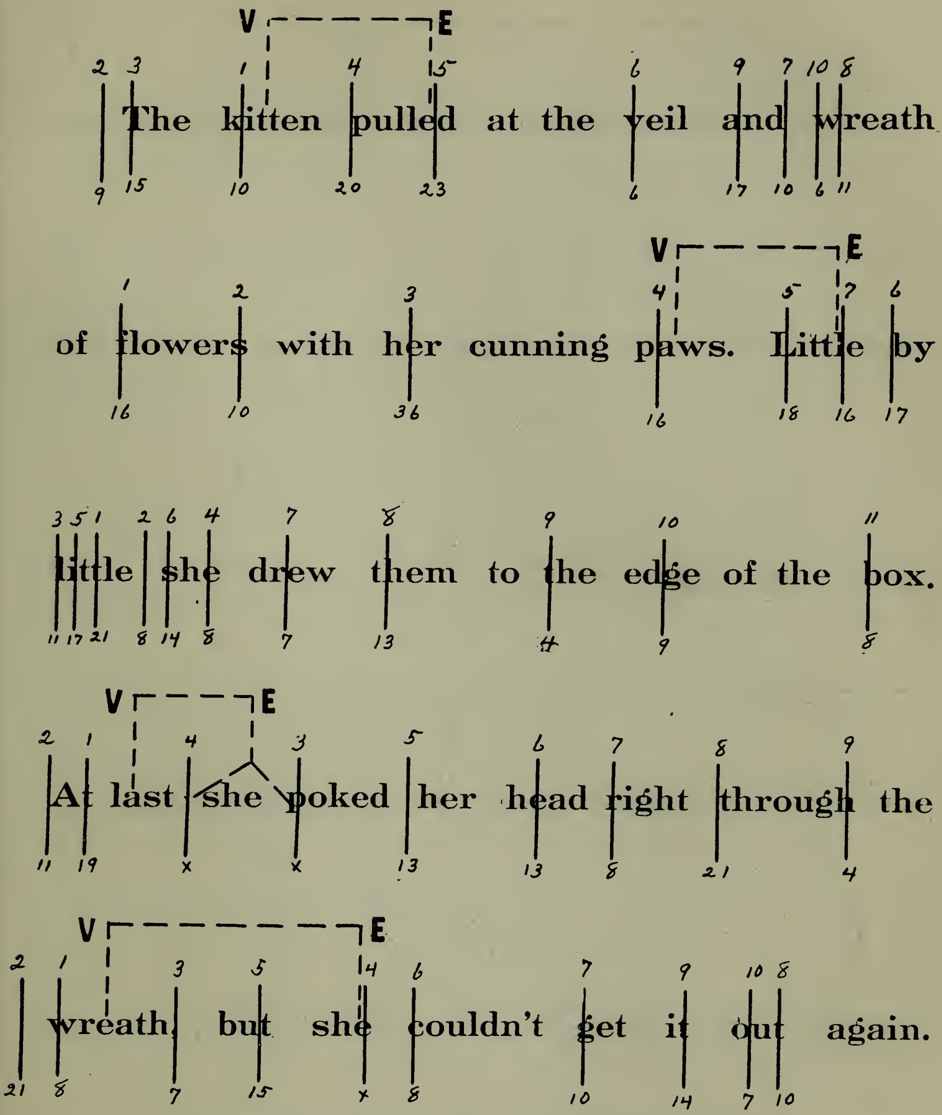
Eye-voice span of Subject E16, poor reader, Grade V. The mark *x* in this and following plates indicates that it was impossible to determine with precision the length of the fixation.

PLATE XII


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

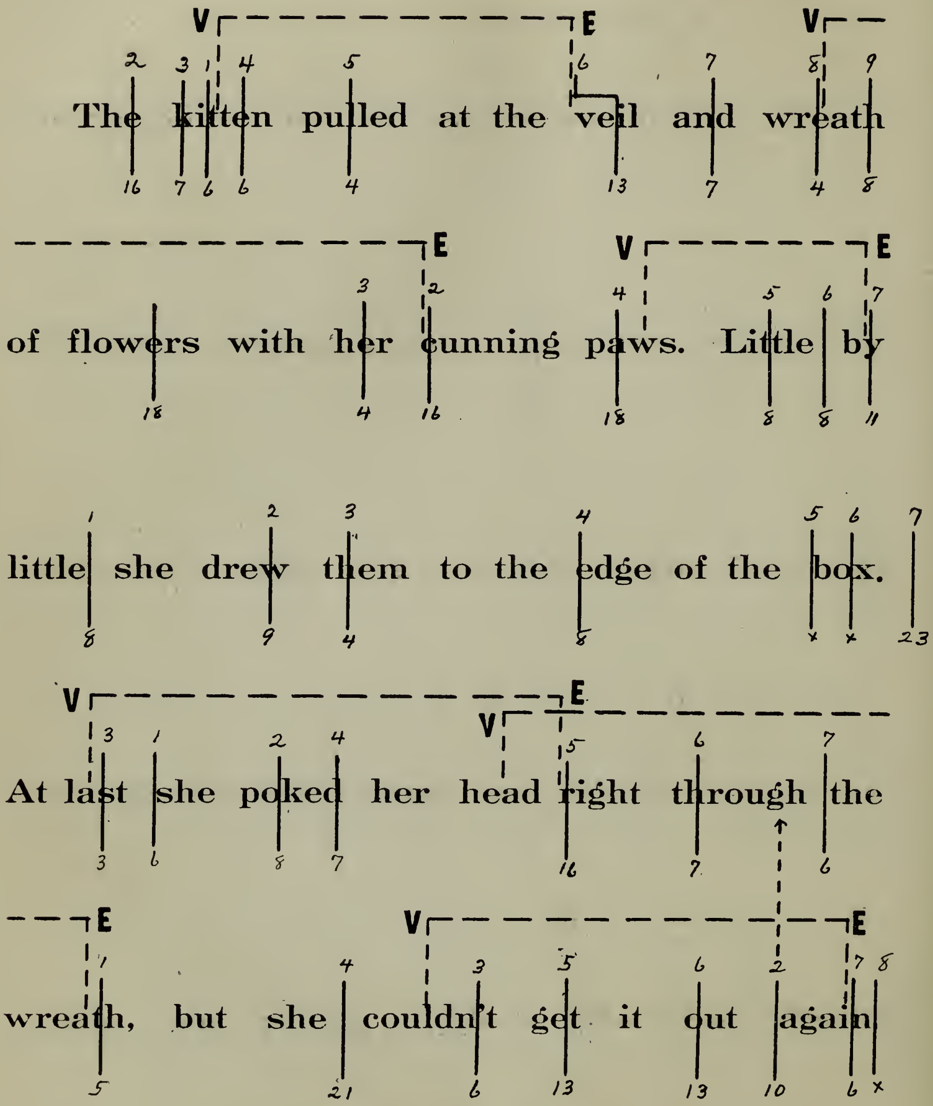
Eye-voice span of Subject E17, good reader, Grade VI

PLATE XIII


V
E
The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath but she couldn't get it out again.

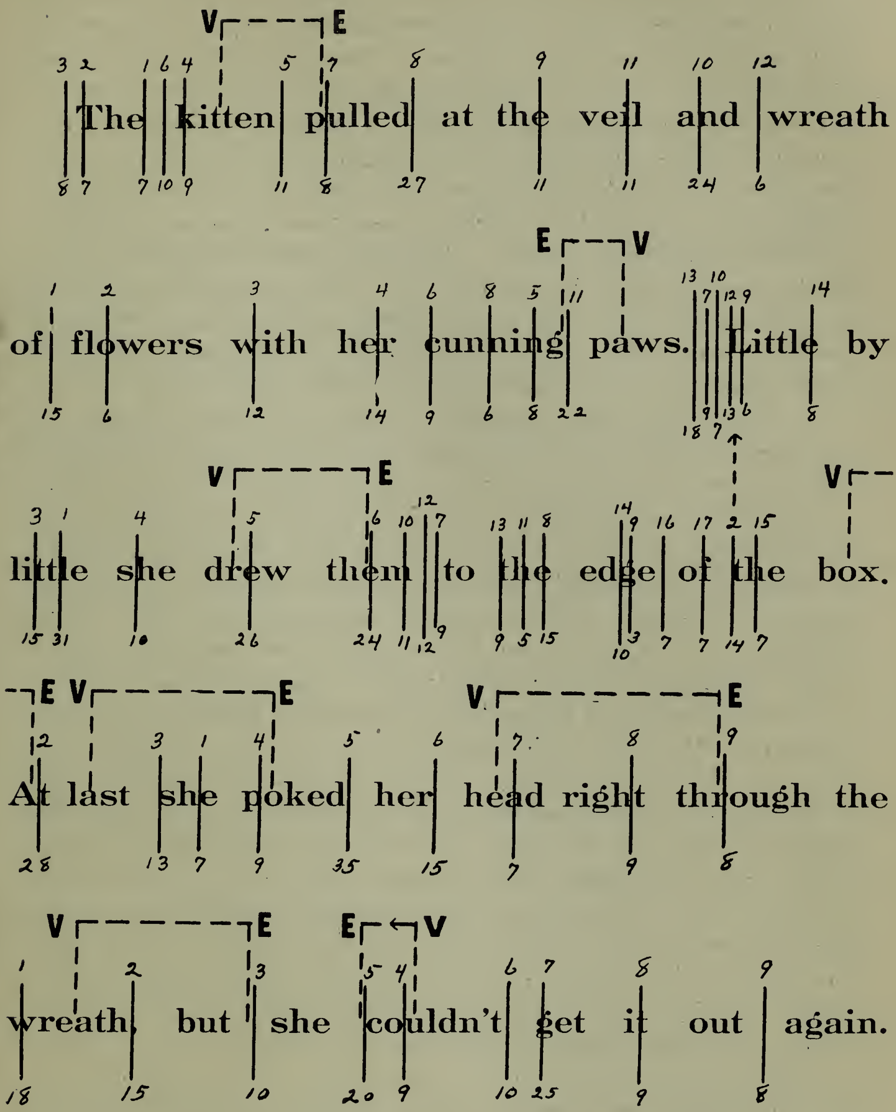
Eye-voice span of Subject E19, poor reader, Grade VI

PLATE XIV


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

Eye-voice span of Subject E22, good reader, Grade VII

PLATE XV


The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
At last she poked her head right through the
wreath, but she couldn't get it out again.
V
E

Eye-voice span of Subject E24, poor reader, Grade VII because there would be no added drop of the eye to the line below. The movement to the second fixation in the last line of Plate XIV not only failed to show an oblique in the downward direction, but it showed a slight oblique in the upward direction. The only possible explanation is that the eye was raised a little more than was necessary to overcome the downward movement of the film. A careful examination of the film shows that, when compared to the degree of slant of a movement of the eye across the same line, the upward movement in this case is approximately equal to the added downward movement when the eye makes its regular drop from line to line. This would locate the fixation following the upward oblique on the line above. This is indicated in the plates by a dotted line above the fixation point, showing that a regressive movement was actually made to the preceding line, although it appears at first glance to be a long movement in the forward direction.

A similar regressive movement is seen in the second fixation of line 3 in Plate XV. Such fixations are sufficiently frequent to indicate that the transition from line to line presents a difficulty to some readers.

Subject E24, in Plate XV, was an exceedingly poor reader for the seventh grade. In lines 2 and 5 his record shows the curious situation of having the eye behind the voice. In both cases this is due to a regressive movement which occurred as the measure was taken. The reading of this subject was poorer than that of the two better readers in the second grade and his eye-voice span was also narrower.

The average eye-voice span for the twenty-four high-school subjects is given in Table III. The same facts are expressed graphically in Figure 2. Here again the greater width of the span for the good readers is made clear. In the freshman class the average eye-voice span of the good readers was greater by 37 per cent, in the sophomore class by 16 per cent, in the junior class by 74 per cent, and in the senior class by 28 per cent. For the total group of high-school subjects the average span of the good readers exceeds that of the poor readers by 36 per cent. This evidence is in agreement with that from the elementary-school pupils, and clearly shows a high degree of correlation between good reading and a wide eye-voice span.

The consistent development in the width of the eye-voice span through the high-school grades is not so evident as in the lower grades. The good readers from the freshman class have a wider span than those from the sophomore and junior classes, and one practically equal to that of the senior class. The average span for the poor readers from the junior class is lower than that of any of the other three. These differences may be accounted for by the fact that in high school little attention is given to reading as a special subject of instruction above the freshman year. The freshman class had been undergoing a series of experimental training exercises conducted by the English department.

TABLE III

AVERAGE EYE-VOICE SPAN BY GRADES—HIGH-SCHOOL SUBJECTS*

SUBJECTS	GRADE				AVERAGE FOR ALL GRADES
	Freshman	Sophomore	Junior	Senior	
Good readers	15.8	14.5	14.6	15.9	15.2
Poor readers	11.5	12.5	8.2	12.4	11.2
Good and poor....	13.7	13.5	11.4	14.2	13.2

* Data for lines 5 and 6 not included.

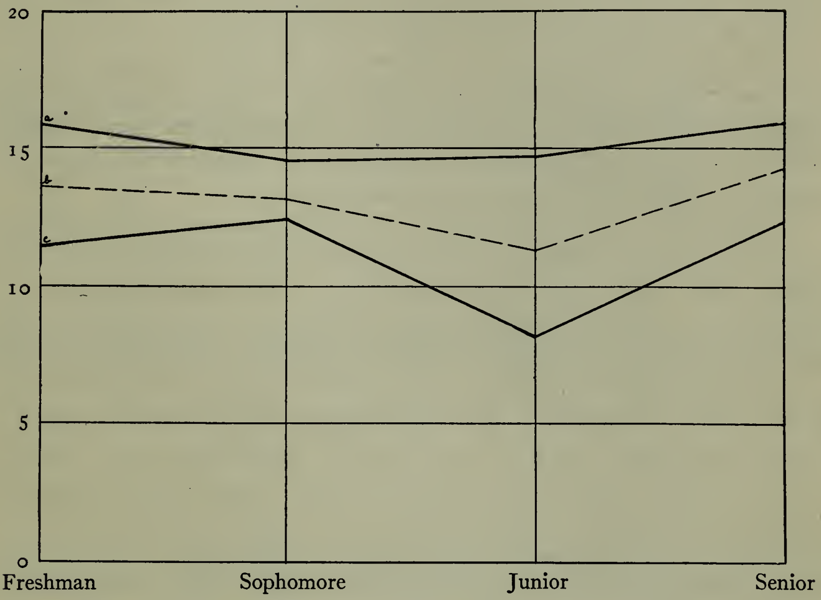


FIG. 2.—Average eye-voice span by grades—high-school subjects

This special training probably accounts for the superiority of the pupils in this class.

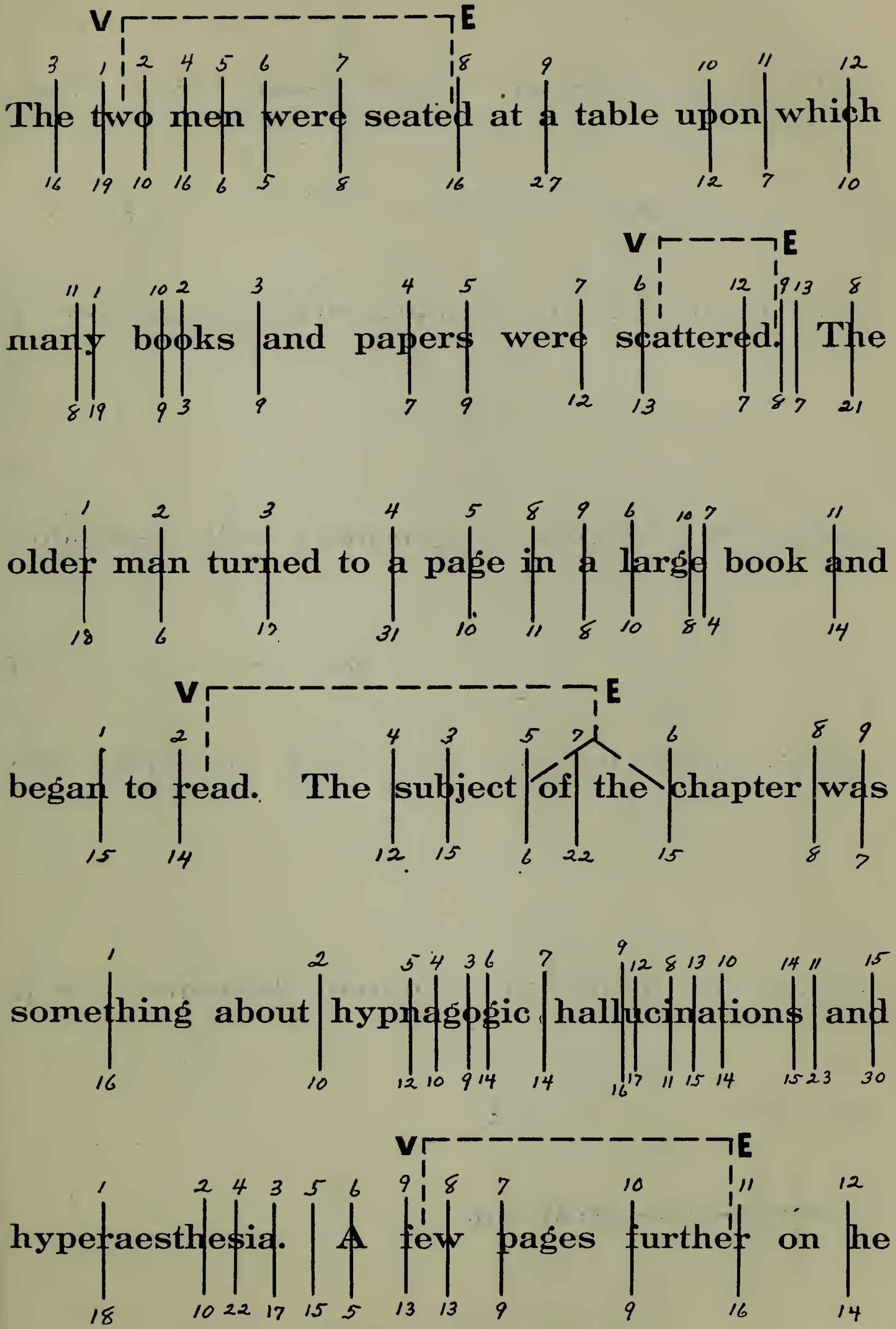
Plates IV and XVI–XX show representative readings of high-school subjects. The record of a good reader from the freshman class, with an average span of 14.3 letter-spaces, is given in Plate IV. The span for this subject is quite regular, showing little variation in any of the eight positions measured. Plate XVI gives the record for a poor reader from the same grade. The average eye-voice span for this reader is 12.4 letter-spaces. The last half of the record for a good reader from the junior class is shown in Plate XVII. This subject had an average span of 17.7 letter-spaces. The ease with which he read the sentence in quotations shows that if the words are simple, it is unnecessary to understand the thought in order to read in a normal fashion. This subject certainly had no idea of the way "the original elements of our consciousness grew up," and yet he read the sentence in the same manner in which he read the first four easy lines. A record of a poor reader from the junior class is given in Plate XVIII. The width of the average span for this subject is only 8.5 letter-spaces, and shows considerable variation throughout the selection. Plates XIX and XX show the records of a good and a poor reader from the senior class having little difference in the average width of their eye-voice span.

On the whole there was less difference in the width of span between the good and poor readers in the high school than in the elementary grades. This is to be expected, since even a poor high-school reader does fairly well. The poorest readers of the elementary school are probably eliminated and never reach high school.

The group of six college students had a development of the eye-voice span beyond that of the high-school group. The average span for the good adult readers is 18.9 letter-spaces, for the poor readers 11.7 letter-spaces, and for the group as a whole 15.3 letter-spaces. The difference between the good and poor readers is again very large.

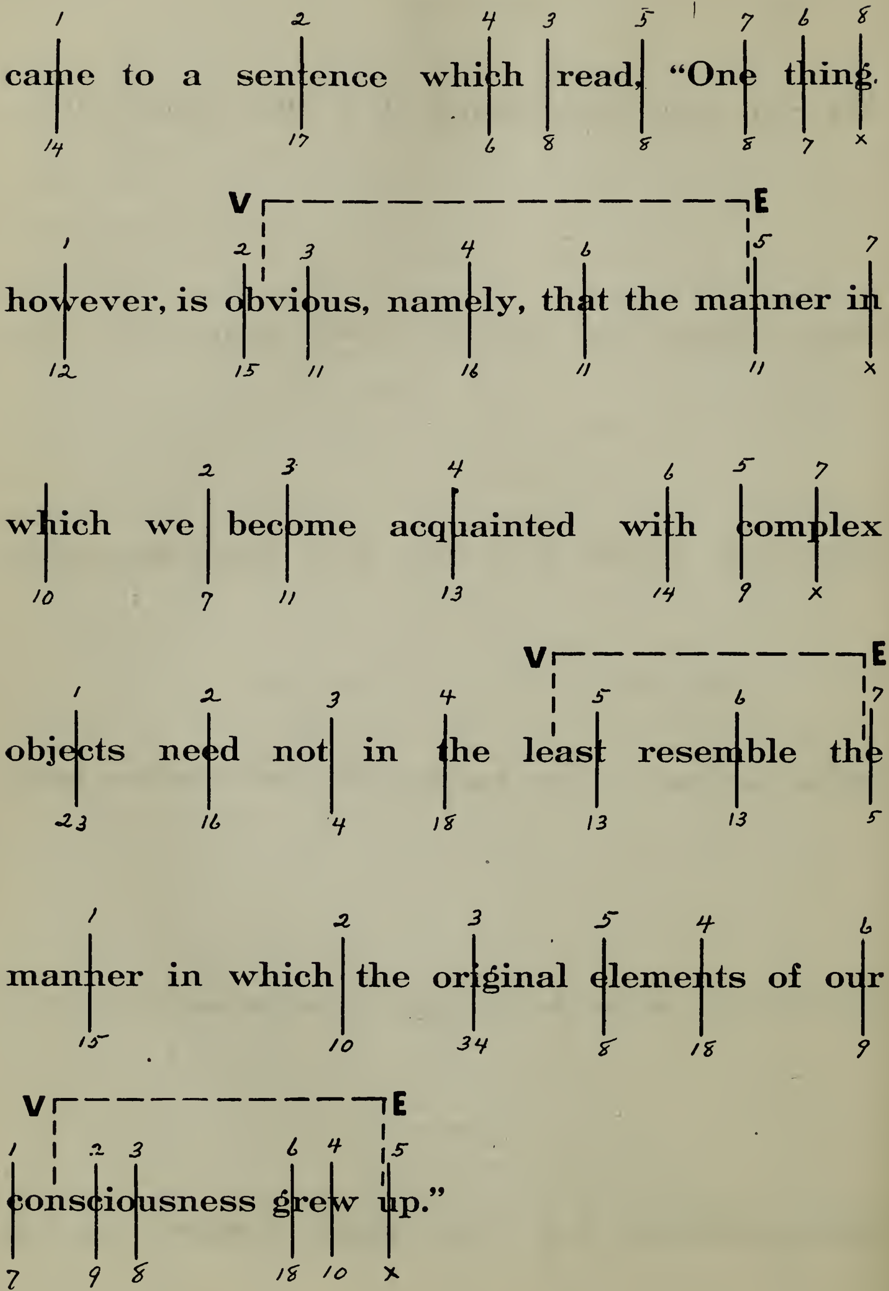
The development of the eye-voice span for the entire fifty-four subjects is shown in Figure 3. The upper solid line represents the twenty-seven good readers, the lower solid line the twenty-seven poor readers, and the middle broken line the good and poor readers taken together. Following the line for the good readers it will be noticed that the greatest rise in the curve occurs during the second, third, and fourth grades. The average span of the good readers in the fifth grade is wider than that of any other grade. The average span for the fifth-, sixth-, and seventh-grade good readers is 14.9 letter-spaces, while the average for the entire high-school group of good readers is only 15.2. Remembering that the average for the sixth grade is abnormally low, owing to the exceptional variation of a single subject, the results seem to indicate that the eye-voice span should be well developed by the end of the fourth grade. They show positively that it is possible for a fifth-grade

PLATE XVI



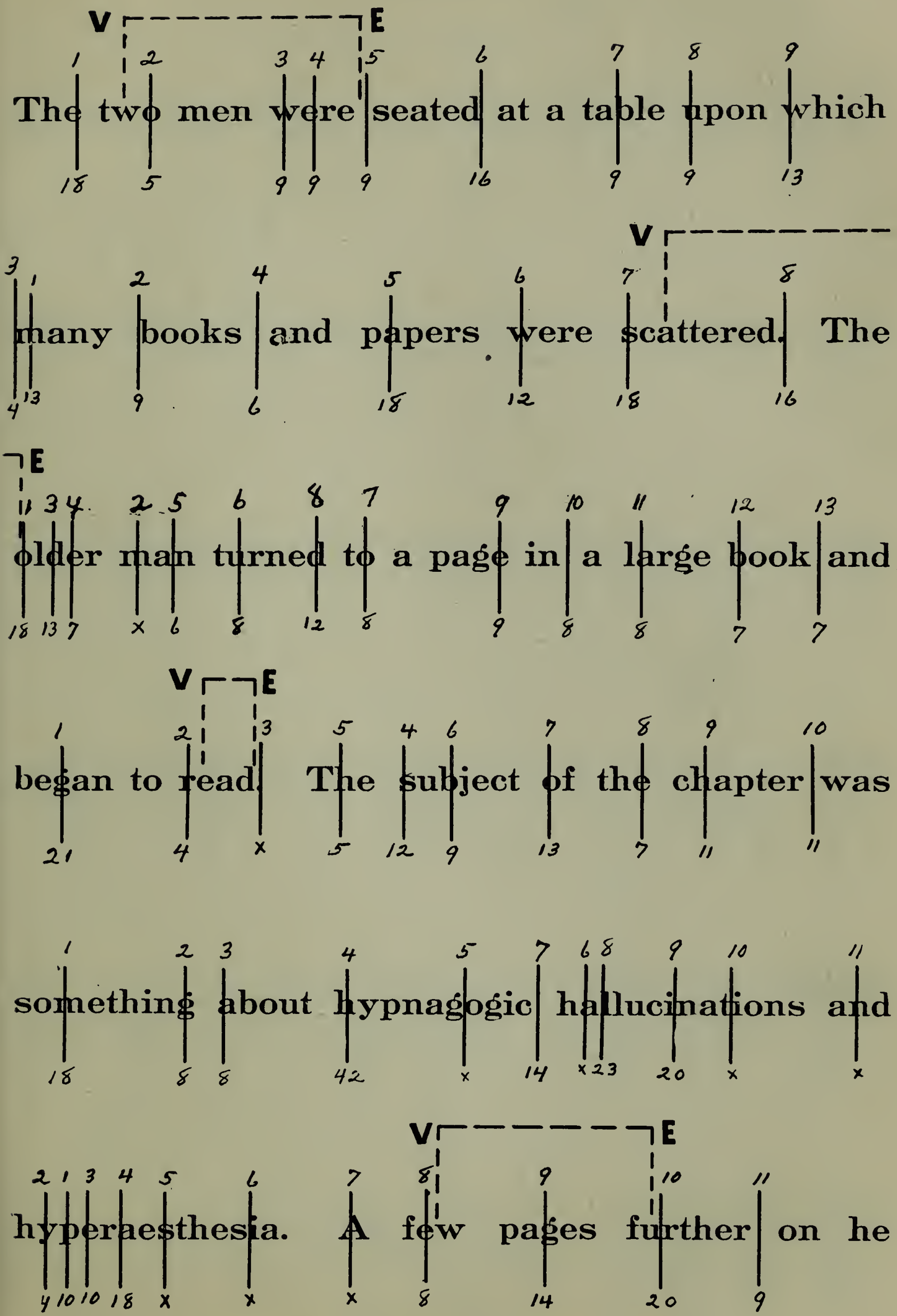
Eye-voice span of Subject H6, poor reader, freshman

PLATE XVII


1 2 4 3 5 7 6 8
came to a sentence which read, "One thing
14 17 6 8 8 8 7 x
V E
1 2 3 4 6 5 7
however, is obvious, namely, that the manner in
12 15 11 16 11 11 x
2 3 4 6 5 7
which we become acquainted with complex
10 7 11 13 14 9 x
V E
1 2 3 4 5 6 7
objects need not in the least resemble the
23 16 4 18 13 13 5
1 2 3 5 4 6
manner in which the original elements of our
15 10 34 8 18 9
V E
1 2 3 6 4 5
consciousness grew up."
7 9 8 18 10 x

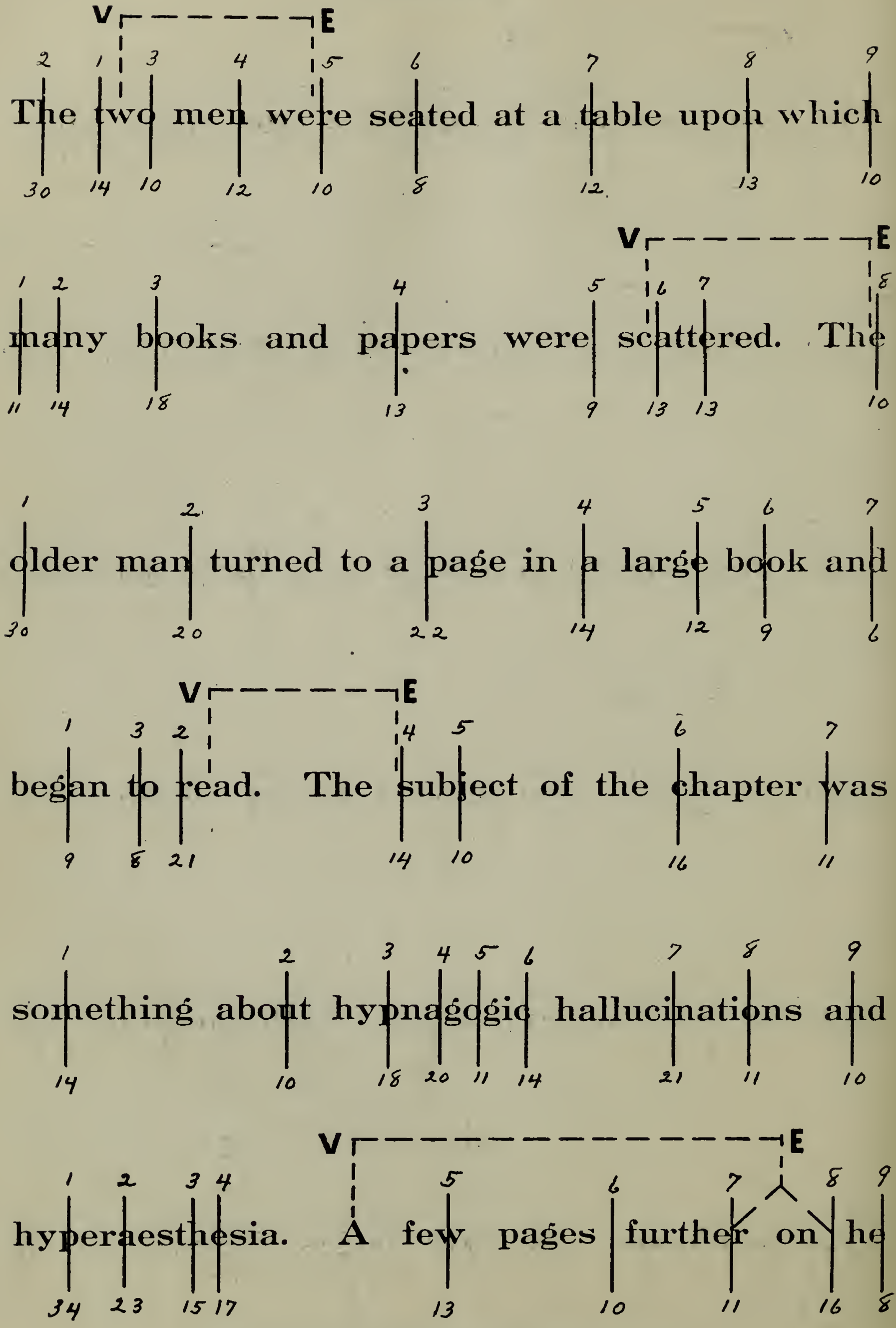
Eye-voice span of Subject H14, good reader, junior

PLATE XVIII


V E
1 2 3 4 5 6 7 8 9
The two men were seated at a table upon which
18 5 9 9 9 16 9 9 13
V
3 1 2 4 5 6 7 8
many books and papers were scattered. The
4 13 9 6 18 12 18 16
E
1 3 4 2 5 6 8 7 9 10 11 12 13
older man turned to a page in a large book and
18 13 7 x 6 8 12 8 9 8 8 7 7
V E
1 2 3 5 4 6 7 8 9 10
began to read. The subject of the chapter was
21 4 x 5 12 9 13 7 11 11
1 2 3 4 5 7 6 8 9 10 11
something about hypnagogic hallucinations and
18 8 8 42 x 14 x 23 20 x x
V E
2 1 3 4 5 6 7 8 9 10 11
hyperaesthesia. A few pages further on he
4 10 10 18 x x x 8 14 20 9

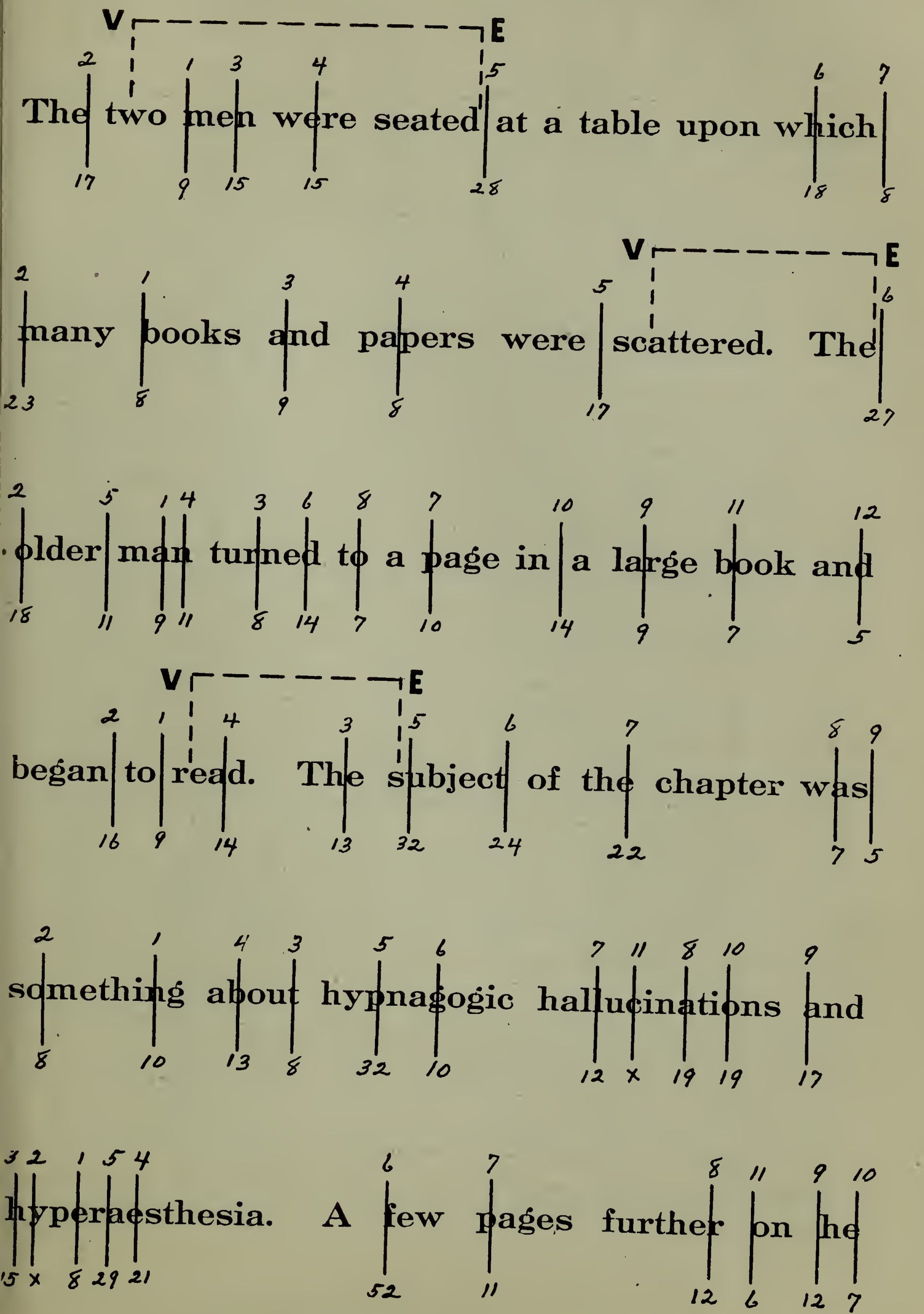
Eye-voice span of Subject H16, poor reader, junior

PLATE XIX


V E
2 1 3 4 5 6 7 8 9
The two men were seated at a table upon which
30 14 10 12 10 8 12 13 10
V E
1 2 3 4 5 6 7 8
many books and papers were scattered. The
11 14 18 13 9 13 13 10
1 2 3 4 5 6 7
older man turned to a page in a large book and
30 20 22 14 12 9 6
V E
1 3 2 4 5 6 7
began to read. The subject of the chapter was
9 8 21 14 10 16 11
1 2 3 4 5 6 7 8 9
something about hypnagogic hallucinations and
14 10 18 20 11 14 21 11 10
V E
1 2 3 4 5 6 7 8 9
hyperaesthesia. A few pages further on he
34 23 15 17 13 10 11 16 8

Eye-voice span of Subject H19, good reader, senior

PLATE XX


V
E
2 1 3 4 5 6 7
The two men were seated at a table upon which
17 9 15 15 28 18 8
V
E
2 1 3 4 5 6
many books and papers were scattered. The
23 8 9 8 17 27
2 5 1 4 3 6 8 7 10 9 11 12
older man turned to a page in a large book and
18 11 9 11 8 14 7 10 14 9 7 5
V
E
2 1 4 3 5 6 7 8 9
began to read. The subject of the chapter was
16 9 14 13 32 24 22 7 5
2 1 4 3 5 6 7 11 8 10 9
something about hypnagogic hallucinations and
8 10 13 8 32 10 12 x 19 19 17
3 2 1 5 4 6 7 8 11 9 10
hyperaesthesia. A few pages further on he
15 x 8 29 21 52 11 12 6 12 7

Eye-voice span of Subject H24, poor reader, senior

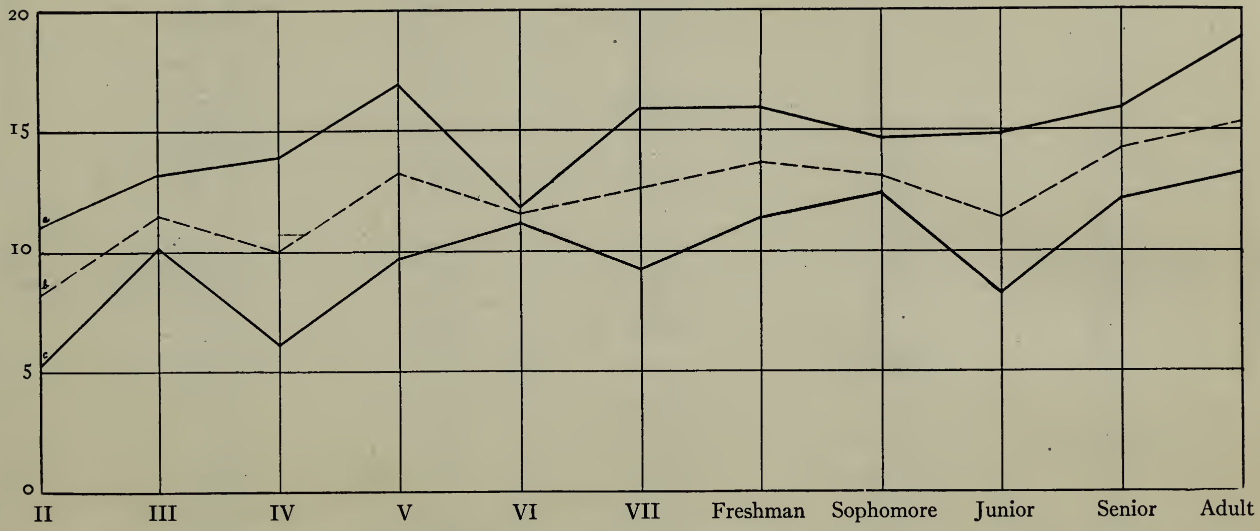


FIG. 3.—Development of eye-voice span—all subjects. Upper line—good readers. Lower line—poor readers. Middle line—both good and poor readers.

reader to maintain an average eye-voice span as wide as the average for any of the school grades above that year. Since the correlation of a wide span with good reading is so clearly shown, it would seem very desirable to give definite training for a wider span in the grades below the fifth.

The line for the poor readers shows on the whole a gradual rise from the second grade to the end of high school. Variations occur in places, but if the curve were smoothed a general rise would appear.

The upward rise of the line for the good readers for the first four grades would indicate a possibility of reaching a maximum eye-voice span during those years, provided specific devices of method for increasing the span could be constructed and applied. The other lines of the curve indicate that at present this is not being accomplished for most of the pupils, but that the span develops gradually throughout the whole school period. This increased emphasis upon the eye-voice span during the first four years would seem to be justified for two reasons. The first is that a wide span is a significant factor in oral reading and these are the years in which the oral method is employed. The second is because, as will be shown more fully in chapter iv, the eye-voice span in oral reading is closely related to the recognition of meaning in silent reading, and whatever benefit might be derived from a wide span in oral reading should be made available for silent reading by the end of the fourth grade.

Regardless of the amount of development through the grades, Figure 3 shows unmistakably that for all grades the good readers have a much wider span than the poor readers. There must be something about a wide eye-voice span which is characteristic of mature reading, and the converse must be true for the narrow span. This matter of the eye-voice span must not be confused with the perception-span. The eye sometimes leads the voice by a distance of several perception-spans. The value of a wide eye-voice span apparently lies in the fact that it allows the mind to grasp and interpret a large meaning unit before the voice must express it.

Relation of eye-voice span to position in sentence.—If the width of the eye-voice span of a single subject is measured at several positions in a selection, it will be found to show considerable variation from point to point. C. T. Gray observed this fact in his study but did not attempt to analyze the variations or explain them. In Quantz's study, referred to in the introduction, these variations were also noted, and an explanation proposed in terms of the position of the line. Quantz found an average eye-voice span of 7.4 words at the beginning of a line, 5.1 words in the middle, and 3.8 words at the end of a line. The results of the present study do not agree with those of Quantz. For the fifty-four subjects used, the width of the span at the beginning of the line is 12.7 letter-spaces, in the middle of the line 12.7, and at the end of the line 10.9. The only point of agreement is that the span is slightly narrower at the end of the line than in other positions. Since an analysis of the variations by position in the line does not afford an adequate explanation as to the reason for the variation, it must be concluded that there are other complicating factors. Accordingly, two factors which might complicate the situation were selected for further analysis. The fact that there is a large difference in the width of the span for the good and the poor readers suggested the possibility that quality of reading might be related in some way to the variation in width of span within a selection. Also, the fact that oral reading is modified according to the units of thought expressed suggested that position in the sentence might be a more potent factor than position in the line. Accordingly, a detailed analysis was made of the variation in the width of the eye-voice span by the position in the sentence for the good and poor readers separately, and then for all subjects taken together.

By referring to Plates III and IV, it will be seen that in the selection used, the eye-voice span was measured in positions at the beginning, middle, and end of the sentences. In the elementary-school selection, the positions where the span was measured were on the following words: (1) "kitten," (2) "wreath," (3) "paws," (4) "drew," (5) "box," (6) "last," (7) "head," (8) "wreath," (9) "couldn't." For the high-school selection the positions were on these words: (1) "two," (2) "scattered," (3) "read," (4) "few," (5) "obvious," (6) "complex," (7) "least," (8) "consciousness." In Tables IV and V and in Figures 4 and 5, the horizontal series of numbers refer to the positions in the selections in the same serial order as just given. By looking again at Plate III it will be found that for the elementary-school selection positions numbered 1 and 6 occurred at the beginning of sentences, positions 2, 4, 7, 8, and 9 fell within sentences, and positions 3 and 5 occurred at the end of sentences. For the high-school selections, Plate IV, positions 1 and 4 occurred at the beginning, positions 5, 6, and 7 within, and positions 2, 3, and 8 at the end of sentences.

Table IV gives the eye-voice span at each of the positions for the elementary-school subjects. It should be read as follows: Subject E1, a good reader from the second grade, had an eye-voice span of 18 letter-spaces at the first position, which was at the word "kitten" in the selection. At the second position, which was at the word "wreath," his span was 13 letter-spaces, etc. His average span was 11.8 letter-spaces, while the average variation among the positions was 2.5 letter-spaces. The second half of the table gives the data for the poor readers. The averages for each position are given for both good and poor readers. Figure 4 shows a comparison of these averages graphically, for both good and poor readers. The numbers on the horizontal axis refer to

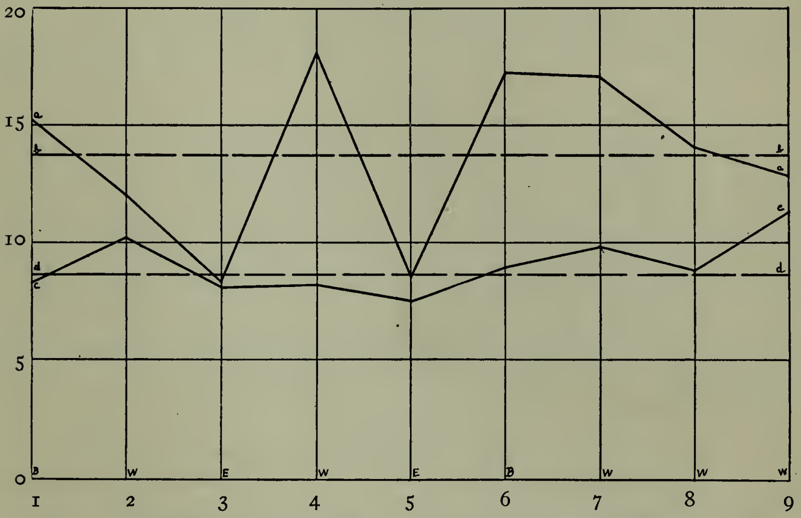


FIG. 4.—Average eye-voice span by position in sentence—elementary subjects. Position at beginning (B), within (W), and end (E) of sentence shown on horizontal axis. Width of eye-voice span shown on vertical axis.

the number of the positions in the selection, while the letters *B*, *W*, and *E* are abbreviations for beginning, within, and end of a sentence. The figures on the vertical axis represent the width of the span in letter-spaces. The upper line is that of the good, and the lower line is that of the poor readers. Lines *b* and *d*, respectively, give the averages of the good and the poor readers for all positions.

The most noticeable deviations in the line *a*, for the good readers, occurred at positions numbers 3 and 5. These are the only positions occurring at the end of sentences. The shortening of the eye-voice span here is relatively very great, and is entirely too pronounced to be accidental. The good readers have evidently found that, for the sake of emphasis, a considerable pause must be made at the end of sentences. The time during the pause gives the eye ample opportunity to get ahead and consequently, on the last word before the pause, the eye-voice span is reduced. The relative shortening of the span on the last word of a sentence would therefore indicate an appreciation of the meaning and an attempt to convey it by expressing, through the pause, the fact that a unit of thought had been given. An examination of the record of the poor readers does not indicate any considerable variation in the length of the span at these points. Evidently the eye has travelled right along, the voice has ignored the ending of a unit of thought and has kept its regular distance behind the eye.

TABLE IV

Average Eye-Voice Span by Position in Sentence—Elementary Subjects

Subject	Grade	Eye-Voice Span at Positions in Paragraph									Average	Average Variation
		1	2	3	4	5	6	7	8	9		
		Good Readers										
E1	II	18	13	11	.....	.....	.....	9	8	12	11.8	2.5
E2	II	6	5	.....	13	13	17	.....	6	12	10.3	3.9
E5	III	14	8	12	12	7	19	16	14	12	12.7	2.8
E6	III	15	15	10	20	.....	11	11	.....	14	13.7	2.6
E9	IV	17	13	6	.....	2	14	8	.....	18	11.1	5.0
E10	IV	19	8	2	28	10	25	20	21	.....	16.6	7.5
E13	V	20	20	11	23	21	17	26	.....	.....	19.7	3.3
E14	V	11	.....	9	11	.....	17	24	18	7	13.9	5.0
E17	VI	20	10	.....	21	7	17	12	18	14	14.9	4.1
E18	VI	10	5	2	19	5	.....	.....	13	8	8.9	4.4
E21	VII	.....	.....	8	16	3	13	20	.....	12	12.0	4.3
E22	VII	17	23	12	.....	.....	22	24	.....	20	19.7	3.4
Average		15.2	12.0	8.3	18.1	8.5	17.2	17.0	14.0	12.9	13.8	2.9
Average Variation		3.6	4.8	3.0	4.5	4.6	2.8	5.8	4.3	2.9	2.7	....
		Poor Readers										
E3	II	1	4	5	4	.....	3	.....	.....	.....	3.4	1.1
E4	II	13	.....	12	3	4	.....	.....	5	.....	7.4	4.1
E7	III	10	5	11	8	1	9	13	7	.....	8.0	2.8
E8	III	10	20	10	5	18	13	13	9	15	12.6	3.6
E11	IV	6	3	6	2	2	4	.....	.....	5	4.0	1.4
E12	IV	11	8	9	15	6	6	3	8	8	8.2	2.3
E15	V	9	.....	7	26	7	13	10	10	17	12.4	4.8
E16	V	11	6	2	.....	8	.....	5	6	11	7.0	2.6
E19	VI	8	.....	8	.....	.....	5	.....	11	.....	8.0	1.5
E20	VI	12	20	.....	.....	12	.....	13	15	.....	14.4	2.5
E23	VII	3	17	12	6	13	20	.....	8	12	11.4	4.2
E24	VII	5	.....	.....	6	4	8	12	9	.....	7.3	2.3
Average		8.2	10.3	8.2	8.3	7.5	9.0	9.8	8.8	11.3	8.7	0.9
Average Variation		3.0	6.4	2.6	5.4	3.2	4.2	3.3	2.0	3.3	2.7	....

A second point of difference between the good and the poor readers is shown by Figure 4 at those positions falling at the beginning of sentences. Positions numbered 1 and 6 show the width of the eye-voice span at the beginning of two sentences. The line for the good readers shows a wider span than the average, at these points, while that of the poor readers varies from the general average by only a very small amount. This gives evidence that when a good reader begins the reading of a new thought, he allows the eye to proceed for a considerable distance before starting to read. This wide initial span gives him an intelligent grasp of the nature of the selection before beginning to read, and enables him to show a proper interpretation through his oral expression. The line for the poor readers shows that the initial span is no wider than the average. This would prevent the reader from obtaining a longer look ahead which is particularly helpful at the beginning of a sentence.

The line for the poor readers differs from that of the good in that it has only a small variation for all positions. For the poor reader, oral reading is evidently a monotonous process of passing over words without any great attempt to emphasize what is read. The good reader varies his span at different positions in the selection in order to bring about a better emphasis. This is shown in Table IV by the difference in the average variation of the averages for all positions. For the good readers the average variation of the averages is 2.9 letter-spaces, while for the poor readers the average variation is 0.9 letter-spaces. The study indicates, therefore, that for elementary-school pupils a variation in the width of the span for different positions is a characteristic of good reading more than of poor reading, and that for good readers the span is wider at the beginning of a sentence, a little narrower within a sentence, and much narrower at the end of a sentence. The poor readers show less variation and exhibit a tendency to commence reading as soon as the material is put before them, having a narrower span at the beginning than at those positions within the sentence. These data are very suggestive of a causal relationship between width of eye-voice span and the interpretation of meaning as exhibited by the treatment of a sentence as a unit of thought and the modification of the eye-voice span to fit such a unit.

The data showing the variation of the span by position in the sentence for the high-school subjects are given in Table V, and are expressed graphically in Figure 5. In general, the results are comparable with those of the elementary subjects. For the high-school selection, positions numbered 2, 3, and 8 occur at the end of sentences. The line for good readers shows a considerable drop in the eye-voice span at these points, while the drop for the poor readers is less marked. The positions at the beginning of sentences are numbers 1 and 4. Here both the good and the poor readers show a span which is wider than the average. The poor readers from the elementary school had a narrower span at the beginning of sentences. Evidently by the time pupils have reached the high school they have learned that a wider span at these positions is desirable and have inhibited the tendency to begin to read as soon as the selection is put before them. The poor readers from the high school look ahead enough to get an idea of the sentence before starting to read. This would be expected, since even a poor reader in the high school reads fairly well, while a poor reader in the elementary school is still in the process of learning to read. The line for the poor readers is more uniform than that of the good readers,

TABLE V

AVERAGE EYE-VOICE SPAN BY POSITION IN SENTENCE—HIGH-SCHOOL SUBJECTS

SUBJECT	GRADE	EYE-VOICE SPAN AT POSITIONS IN PARAGRAPH								AVERAGE	AVERAGE VARIATION
		1	2	3	4	5	6	7	8		
		Good Readers									
H1	F	14	18	13	16	25	20	32	21	19.9	4.6
H2	F	14	15	13	12	12	15	15	18	14.3	1.5
H3	F	......	13	......	12	15	......	......	......	13.3	1.1
H7	So	......	......	21	16	......	6	11	6	12.0	5.2
H8	So	26	11	10	17	13	8	23	16	15.5	5.0
H9	So	23	14	11	......	......	......	......	......	16.0	4.7
H13	J	......	10	14	......	......	18	20	7	13.8	2.9
H14	J	22	17	10	......	26	......	15	16	17.7	4.2
H15	J	11	12	12	18	10	......	......	11	12.3	1.9
H19	Se	8	11	8	20	10	14	17	14	12.8	3.5
H20	Se	30	16	......	......	......	......	......	......	23.0	7.0
H21	Se	7	16	13	......	......	......	......	......	12.0	3.3
Average		17.2	13.9	12.5	15.9	15.9	13.5	19.0	13.6	15.2	1.8
Average Variation		7.1	2.3	2.3	2.2	5.5	4.3	5.1	4.1	2.7	....
		Poor Readers									
H4	F	9	10	11	......	......	......	......	......	10.0	0.7
H5	F	14	11	9	10	10	14	13	15	12.0	2.0
H6	F	16	7	19	14	12	13	......	6	12.4	3.5
H10	So	......	14	14	16	24	6	12	13	14.1	3.3
H11	So	11	8	8	13	8	15	8	6	9.6	2.5
H12	So	18	15	15	15	12	9	13	13	13.8	2.0
H16	J	11	12	2	10	8	10	9	6	8.5	2.4
H17	J	3	5	3	......	10	5	......	2	4.7	2.0
H18	J	......	12	11	......	......	......	......	......	11.5	0.5
H22	Se	15	9	22	18	9	15	9	14	13.9	3.6
H23	Se	13	9	10	10	9	13	11	11	10.8	1.3
H24	Se	17	11	9	......	......	10	......	15	12.4	2.9
Average		12.7	10.3	11.1	13.3	11.3	11.0	10.7	10.1	11.2	0.8
Average Variation		3.3	2.3	4.3	2.5	3.1	3.0	1.7	4.0	1.9	....

as was the case with the elementary subjects. Uniformity for the different positions, however, is evidently an indication that the sentence as a unit of thought is being ignored and that the eye and voice travel along with little regard for the separation of thought into different sentences.

A summary comparison of the eye-voice span at the different positions in the sentence is given in Table VI, for all subjects. Figure 6 presents these same results graphically. The summaries were compiled by grouping together all positions occurring at the beginning of sentences in one group, those occurring within the sentence in another, and those falling at the end of a sentence in a third group. The table shows the results of this grouping for the elementary, high-school, and adult subjects separately, and also for all fifty-four subjects together. In each table the results for the good and the poor readers are separated.

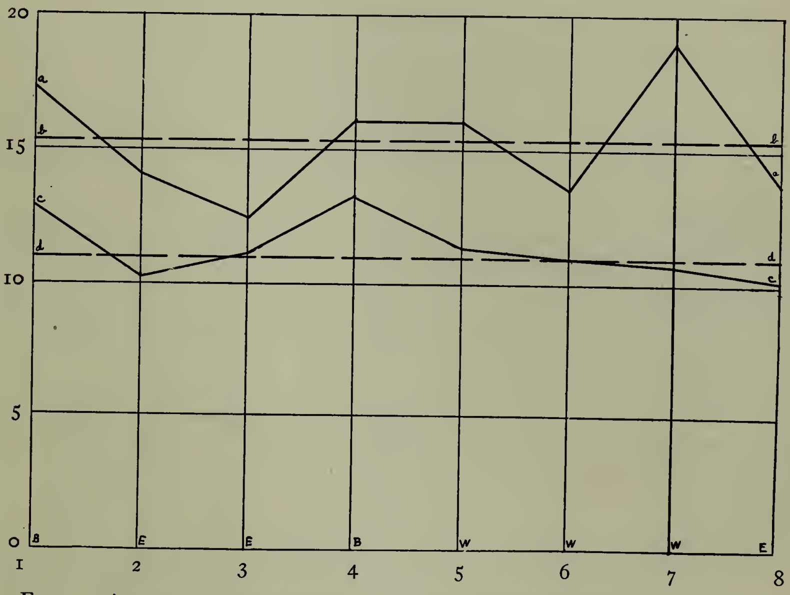


FIG. 5.—Average eye-voice span by position in sentence—high-school subjects

An examination of these data reveals two conspicuous facts: first, that the width of the eye-voice span is different at various positions in a sentence, and secondly, that the good and poor readers do not exhibit these differences in the same fashion.

The results of the investigation show that for the entire group of fifty-four subjects the eye-voice span is 15.9 letter-spaces at the beginning of a sentence, 13.4 spaces within the sentence, and 10.9 spaces at the end. The differences are even more marked in the group of twenty-seven good readers. For this group the average span at the beginning of a sentence is 18.7 letter-spaces, within the sentence 16.5 spaces, and at the end 11.9 spaces. The average span for the good readers at the beginning is greater than the average span within the sentence by 13 per cent and greater than the average at the end of the sentence by 57 per cent. For the poor readers the span at the beginning is greater than the span at the end in all three groups of subjects, and is greater than the span within the sentence for all but the elementary pupils. The evidence is quite conclusive, therefore, that the width of the eye-voice span varies according to the position in the sentence.

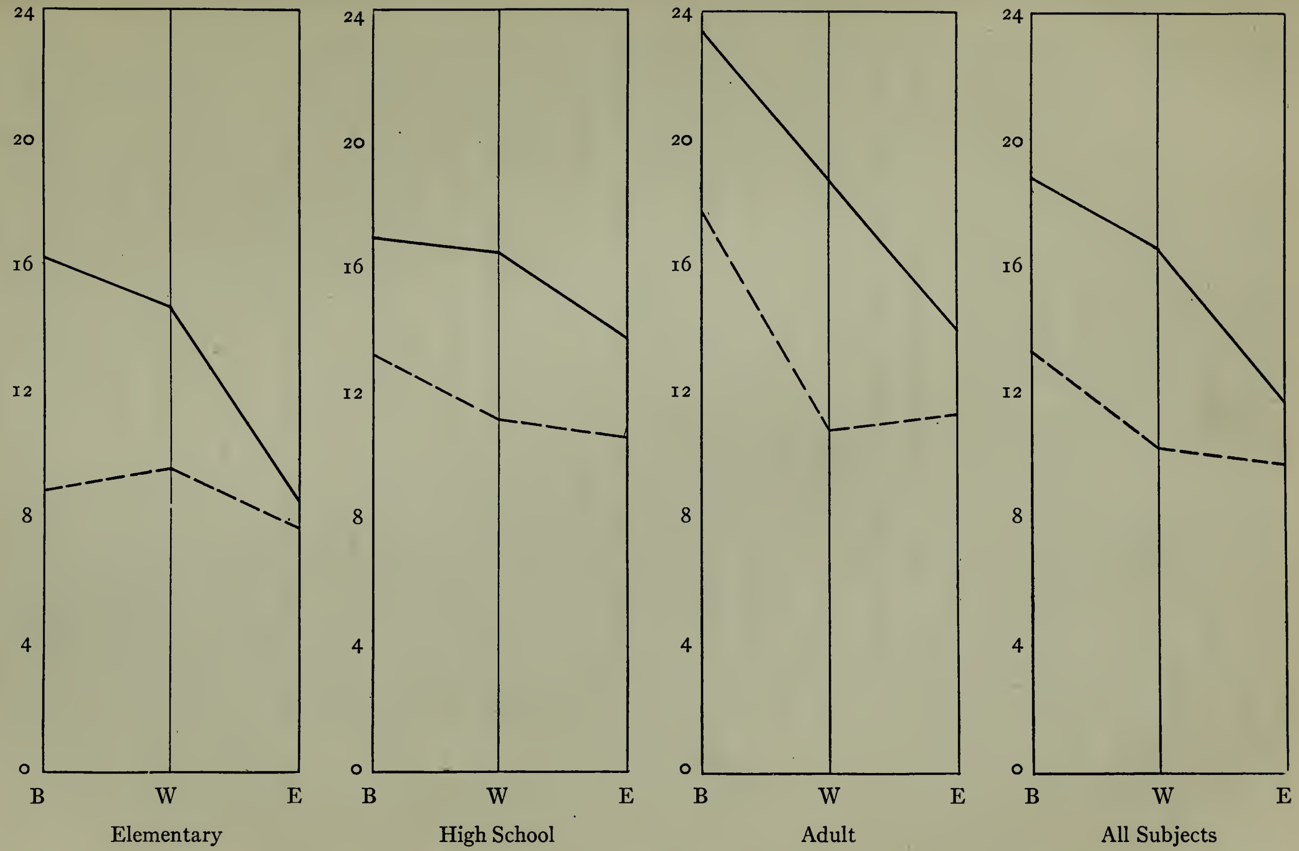
TABLE VI

Average Eye-Voice Span at the Beginning, Within, and at the End of Sentence—All Subjects

Subjects	Beginning of Sentence	Within Sentence	End of Sentence
Elementary subjects:			
Good readers	16.1	14.8	8.4
Poor readers	8.6	9.5	7.9
Good and poor	12.3	12.1	8.1
High-school subjects:			
Good readers	16.6	16.2	13.3
Poor readers	12.9	11.0	10.5
Good and poor	14.7	13.6	11.9
Adult subjects:			
Good readers	23.5	18.6	14.0
Poor readers	17.7	10.8	11.3
Good and poor	20.6	14.7	12.6
All subjects:			
Good readers	18.7	16.5	11.9
Poor readers	13.1	10.4	9.9
Good and poor	15.9	13.4	10.9

The characteristics of the variations of the eye-voice span at different positions in the sentence are not the same for good and poor readers. The curve for the good readers shows more regard for thought units, with the highest point always at the beginning and the lowest point always at the end of the sentence. The gross change in the width of the span for the different positions also is greater for the good readers.

The fact that the eye-voice span varies with the position in the sentence is of considerable significance. If the span varied only with



Elementary High School Adult All Subjects

Fig. 6.—Average eye-voice span at the beginning (B), within (W), and at the end (E) of sentence—all subjects. Solid line represents good readers. Broken line represents poor readers.

the position in the line, as Quantz's study indicated, the determining factors would be entirely mechanical, and would be governed by the printed form of the selection. The control of the span, in that case, would be a matter of the mechanics of book construction, and would be independent of any teaching factor. But if the span varies with the position in the sentence, it is evident that the content of the meaning is recognized, and that the eye-voice span is determined by thought units rather than by printed line units. Position in the line may be a minor factor, as the results of this study showed a slightly narrower span at the end of a line, but the differences due to position in the sentence are much greater.

For all three classes of subjects, there is agreement among the good readers in that a wide eye-voice span occurs at the beginning of a sentence. The situation at the beginning of a sentence is different from that of any other position. After one has started to read, the meaning of the thought covered will carry him along to some extent, and will enable him to anticipate what is coming. At the beginning of a sentence there is no sequence of words to give one the cue to the content of the new thought. The only way to get this is to look ahead until the meaning of the sentence is partially recognized, and the kind of vocal expression needed is made clear. The good readers recognize this need for a wider span at the outset and inhibit the voice reaction until the eye has gained a considerable lead. The poor readers in the grades above the elementary school have also learned this, but evidently those in the elementary school are not mature enough in reading to recognize any special difficulty at the beginning of a sentence. Instead of making a relatively longer span, they react to the situation by a relatively shorter one. They begin to read as soon as they see the sentence, and have not learned to inhibit their reading until the eye has taken in a larger unit of meaning. This difficulty could be easily corrected by a little training in class which would teach the pupils to wait before starting to read until they get a larger unit of thought.

The evidence of all subjects agrees that there is a shorter span at the end of a sentence. The good readers have a relatively shorter span than the poor readers. The explanation of this shorter span goes back again to the fact that the sentence is the large unit of meaning. When the eye reaches the end of this unit it modifies its movements according to the meaning recognized and the voice catches up before beginning the new thought. In order that the voice shall express the thought clearly, a pause is necessary at the end of the sentence. This pause gives the eye ample opportunity for a large eye-voice span before it is time to commence the next sentence. A poor reader pays less attention to the sentence as a unit of meaning. This is especially true of younger children who are very immature readers. For them the whole process is a more or less monotonous repetition of words as they are encountered. The eye moves along at a regular rate and the voice follows. The end of a sentence creates no special disturbance for it is passed over with little attention. Consequently there is little change in the eye-voice span. The curve for the poor readers from the elementary school would seem to indicate that some such situation exists. There is little variation in the width of the span for any position in the sentence. If the variation in eye-voice span at the beginning and the end of a sentence makes possible a greater emphasis on meaning, the lack of such a variation may account for the fact that the subjects showing such lack are classed as poor readers.

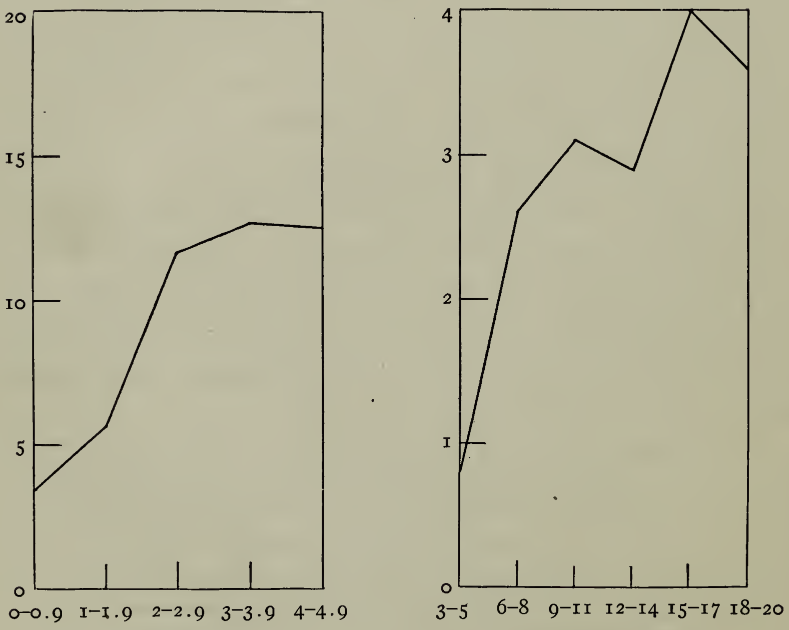
Relation of eye-voice span to reading rate.—In the previous sections of this chapter it has been shown that a wide eye-voice span correlates with good reading and also with certain positions in the sentence. Since numerous studies have shown a correlation between quality and rate of reading, it would be of interest to find if the eye-voice span is related to rate in the same way. Accordingly, a study was made of the relation of eye-voice span to reading rate for the subjects in the elementary school, the high school, and for the entire group of subjects taken together. The reading rate of each subject was taken with the same material at the time of the experiment. Comparisons are given both in terms of rate per second and the average eye-voice span. The data for the elementary school are given in Table VII, for the high school in Table VIII, and for all subjects taken together in Table IX. The figures showing the same data are numbered to correspond with the tables.

Table VII gives the data for the elementary subjects and should be read as follows: Using rate per second as a base, it was found that one subject had a rate falling between 0 and 0.9 words per second and an eye-voice span of 3.4 letter-spaces, two subjects had rates falling between 1 and 1.9 words per second and an average eye-voice span of 5.7 letter-spaces, nine subjects had rates falling between 2 and 2.9 words per second and an average span of 11.6 spaces, etc. The second part of the table gives the data based upon eye-voice span instead of rate, and should be read: Two subjects had average spans of between 3 and 5 letter-spaces and an average rate of 0.8 words per second, six

TABLE VII

Relation of Eye-Voice Span to Reading Rate—Elementary Subjects

Number of Subjects	Rate of Words per Second	Average Eye-Voice Span
	By Rate	
1	0–0.9	3.4
2	1–1.9	5.7
9	2–2.9	11.6
9	3–3.9	12.6
3	4–4.9	12.5
	By Eye-Voice Span	
2	0.8	3–5
6	2.6	6–8
5	3.1	9–11
8	2.9	12–14
1	4.0	15–17
2	3.6	18–20



By rate

By eye-voice span

Fig. 7.—Relation of eye-voice span to reading rate—elementary subjects. By rate: words per second shown on horizontal axis; average eye-voice span on vertical axis. By eye-voice span: words per second shown on vertical axis; average eye-voice span on horizontal axis.

subjects had spans falling between 6 and 8 letter-spaces and an average rate of 2.6 words per second, etc. The tables and figures for the elementary subjects show a high positive correlation between rapid reading and a wide eye-voice span.

The comparisons for the high-school pupils are given in Table VIII and Figure 8. Here again a positive correlation is shown between rapid reading and a wide span. The reading rates of the high-school subjects are more nearly uniform than those of the elementary school, all falling within the interval between 2 and 4.9 words per second. The second figure showing the relation between rate and eye-voice span, by using the average span for a base, exhibits a very great variation in the average eye-voice spans. The extremes on both ends of the curve are represented by only a single subject and because of this small number of cases the line for the extremes is dotted instead of solid. The curves are not so steep as those for the elementary school because the increase in rate is less during the high-school years.

Table IX and Figure 9 give the results for the entire group of fifty-four subjects. The evidence here is perfectly clear that a wide eye-voice span is a characteristic of rapid readers for subjects of all grades of advancement from the second grade of the elementary school to the college.

It has been shown in the first part of this chapter that some good readers in the fifth grade have an eye-voice span as wide as many high-school pupils. If it is possible to develop a wide eye-voice span in the first four years of school it would be an aid not only to quality of reading but also to rate. A training experiment, with this aim in view, for pupils in the second, third, and fourth grades, would furnish an interesting problem for further research.

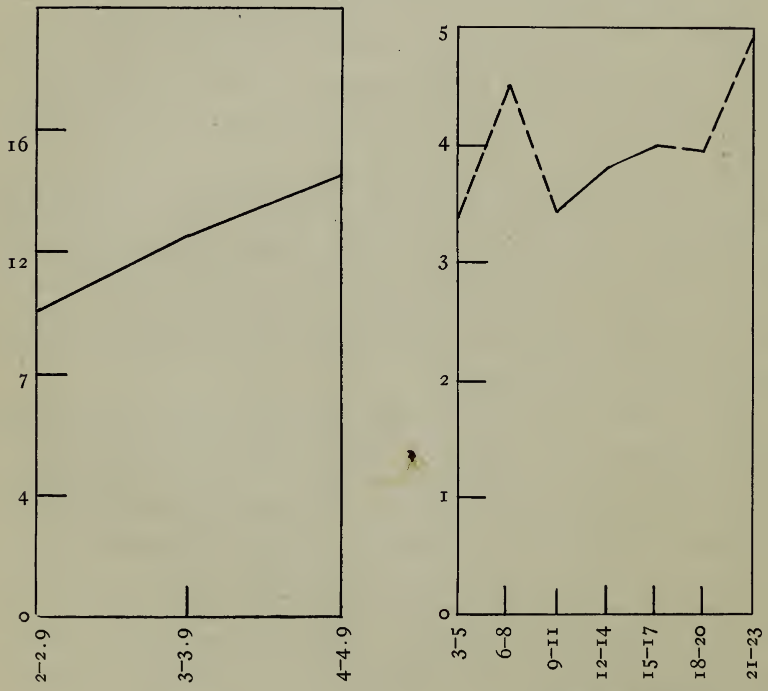
The fact that a wide eye-voice span provides a larger unit of reading material which can be covered by the eye before the voice reaches it makes possible a more rapid oral presentation of the unit without failing to give each word its proper emphasis. The total time for reading such a unit may be reduced by rapid reading, without changing the relative amount of time given to its parts for the sake of proper expression. This cannot be done, however, unless the eye-voice span is wide enough to provide a large unit of meaning. Rapid reading without a correspondingly wide eye-voice span would be a monotonous or "sing-song" pronunciation of words.

Relation of eye-voice span to number of fixations.—An examination of plates giving the records of eye-movement will show that the number

TABLE VIII

RELATION OF EYE-VOICE SPAN TO READING RATE—HIGH-SCHOOL SUBJECTS

NUMBER OF SUBJECTS	RATE IN WORDS PER SECOND	AVERAGE EYE-VOICE SPAN
	By Rate	
1	2–2.9	10.0
16	3–3.9	12.6
7	4–4.9	14.6
	By Eye-Voice Span	
1	3.3	3–5
1	4.5	6–8
4	3.4	9–11
14	3.8	12–14
2	4.0	15–17
1	3.9	18–20
1	4.8	21–23



By rate

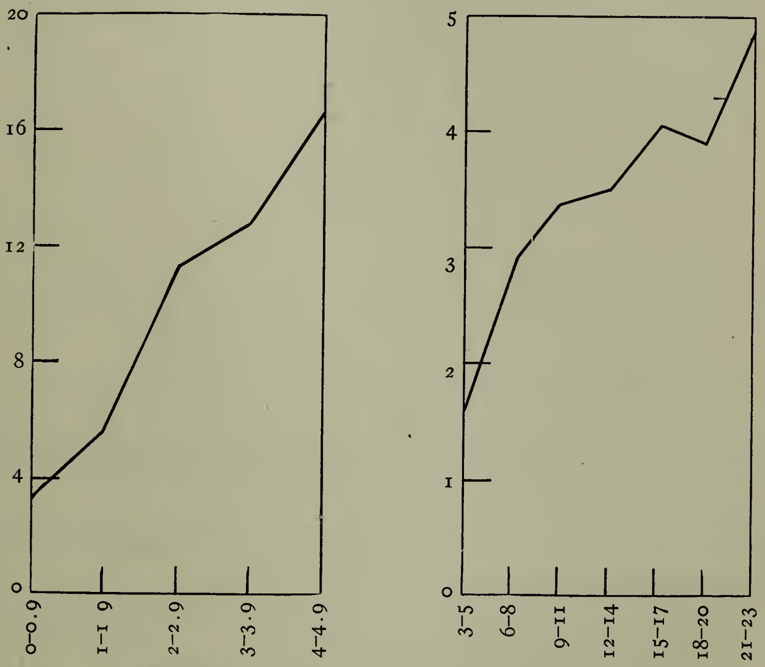
By eye-voice span

FIG. 8.—Relation of eye-voice span to reading rate—high-school subjects. By rate: words per second shown on horizontal axis; average eye-voice span on vertical axis. By eye-voice span: words per second shown on vertical axis; average eye-voice span on horizontal axis.

TABLE IX

RELATION OF EYE-VOICE SPAN TO READING RATE—ALL SUBJECTS

NUMBER OF SUBJECTS	RATE OF WORDS PER SECOND	AVERAGE EYE-VOICE SPAN
	By Rate	
1	0–0.9	3·4
2	1–1.9	5·7
10	2–2.9	11.3
29	3–3·9	12.7
12	4–4·9	16.5
	By Eye-Voice Span	
3	1.6	3–5
7	2.9	6–8
10	3·3	9–11
24	3·5	12–14
4	4·1	15–17
5	3·8	18–20
1	4.8	21–23



By rate

By eye-voice span

FIG. 9.—Relation of eye-voice span to reading rate—all subjects. By rate: words per second shown on horizontal axis; average eye-voice span on vertical axis. By eye-voice span: words per second shown on vertical axis; average eye-voice span on horizontal axis.

of fixation pauses per line varies from subject to subject. Table X gives the relation of the width of the eye-voice span to the number of fixations per line, both by eye-voice span and by number of fixations. This table using eye-voice span as a base should be read as follows: Three subjects had an average eye-voice span of from 3 to 5 letter-spaces with an average of 13 fixations per line; seven subjects had an average span of 6 to 8 letter-spaces with an average of 12 fixations per line, etc. The second table is read in the same manner using the average number of fixations per line as a base. Figure 10 gives a graphic representation of the same data. The dotted lines at the right of each curve indicate that a limited number of subjects occurs at the extremes, and that the variation in the general form of the curve is not a characteristic of the subjects as a group. In each case the break in the general form of the curve is caused by a single subject.

TABLE X

Relation of Eye-Voice Span to Average Number of Fixations per Line—All Subjects*

Number of Subjects	Average Eye-Voice Span	Number of Fixations
	By Eye-Voice Span	
3	3–5	13.0
7	6–8	12.0
10	9–11	9.3
24	12–14	9.0
4	15–17	7.9
5	18–20	7.5
1	21–23	9.9
	By Number of Fixations	
13	15.1	6–7
26	12.8	8–9
10	11.5	10–11
2	7.3	12–13
1	12.5	14–15
2	5.7	16–up

*Lines 5 and 6 in high-school selection omitted.

The curves indicate a negative correlation between the width of the eye-voice span and the number of fixations per line. As the size of the span increases the number of fixations decreases. All of the previous studies of eye-movement have shown that a small number of fixations per line is a characteristic of good readers. Consequently it would be expected that the kind of correlation shown by Figure 10 would exist. An experiment attempting to reduce the number of fixations per line by training for a wider eye-voice span might give some interesting results.

Relation of eye-voice span to regressive movements.—One of the characteristic features of both oral and silent reading is that the eye fixations do not progress continuously across a line, but that their progress is interrupted from time to time by backward or regressive movements. The number and length of these regressive movements varies with different subjects, but they are found on the records of all readers. The backward movement of the eye is evidence that the reader has not grasped the entire meaning of the words which the eye has passed over and that a second fixation is needed.

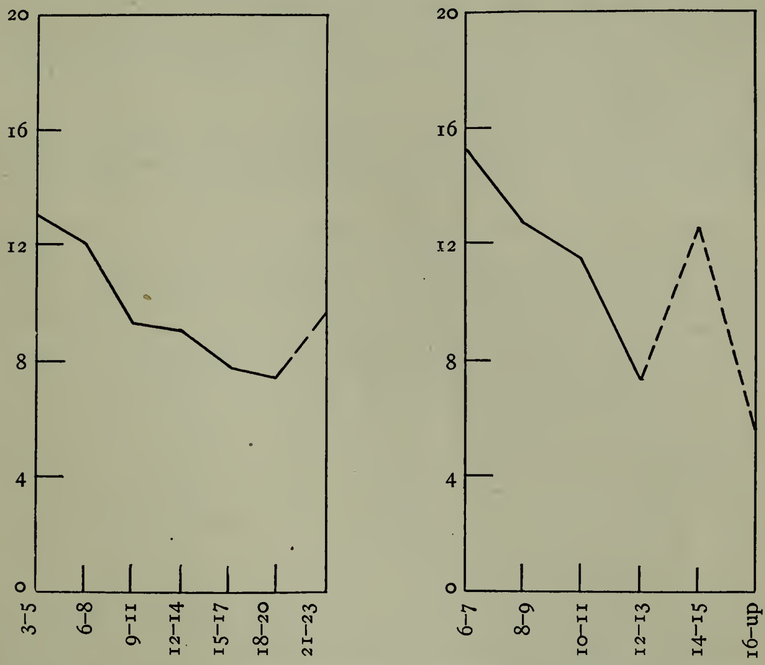


FIG. 10.—Relation of eye-voice span to average number of fixations per line—all subjects. By eye-voice span: average eye-voice span shown on horizontal axis; average number fixations per line on vertical axis. By number of fixations: average number of fixations per line on horizontal axis; average eye-voice span on vertical axis.

It would be expected that subjects having a wide eye-voice span would be able to get the meaning of a sentence with fewer regressive movements than those keeping the eye and voice close together. Accordingly, a study was made of the relation of the eye-voice span to the number of regressive movements per line. The results appear in Table XI. No consistent relationship is shown by this table, except that the subjects having the largest number of regressive movements have a somewhat narrower span.

The fact that no correlation was made apparent by this method of comparison indicates that either none existed or that complicating factors were off-setting each other. If the plates reproduced in the first part of this chapter are studied, it will be seen that there are different kinds of regressive movements.

Plates VI and VII will serve to illustrate these different types of regressive movements. Plate VI shows that this reader makes a great many regressive movements, averaging 5.8 per line. If the serial order of the fixations is followed it will be observed that there is a continual forward and backward movement all along the line. Of the first 10 fixations in the first line 5 are preceded by regressive movements. Eleven fixations with 5 regressive movements are required to recognize the first three words. The cause of such regressive movements is not that the eye passes over words too rapidly and returns to observe some part which has been overlooked, but a general confusion and inability to recognize the words after the eye has seen them. This kind of regressive movement is the mark of very poor reading ability.

TABLE XI

RELATION OF EYE-VOICE SPAN TO NUMBER OF REGRESSIVE MOVEMENTS PER LINE

Number of Subjects	Average Number Regressive Movements per Line	Average Eye-Voice Span
7	0-0.9	12.9
29	1-1.9	12.8
10	2-2.9	13.2
6	3-3.9	10.0
0	4-4.9	. . . .
2	5-5.9	5.7

Plate VII shows the record of a subject who also has a large number of regressive movements, averaging 3.1 per line. It is plainly evident, however, that these backward movements are of an entirely different type from those in Plate VI. In the first line the movement from fixation 5 to fixation 6 is in the backward direction. The reason for this appears to be that the eye has attempted too much in trying to finish the line by one fixation after number 4. It risked a long jump, failed to grasp the entire meaning, and moved back to pick up the part missed. Good reading demands that the jump from fixation to fixation be as long as possible. This reader attempts very long eye-movements all through the selection. Occasionally he fails to grasp as much as the eye covers and the eye must make a regressive movement to recover the words missed. In such a situation, a regressive movement is a characteristic of good rather than of poor reading. It is just the opposite of the practice of the reader shown in Plate VI. For him, the regressive movements were not the result of attempting too long an eye-movement, but were caused by the necessity of seeing every detail of a word before being able to recognize it. The important facts about regressive movements are neither their number nor their length, but are rather concerned with the eye-movements which precede them. A study of regressive movements must, therefore, be based upon the preceding eye-movements. Subject E6, shown in Plate VII, made 16 regressive movements. Of these, nine followed eye-movements of more than ordinary length, being in terms of letter-spaces: 9–9–11–12–13–15–16–16 and 20. Backward eye-movements were necessary for this subject because the eye had attempted to cover too long a distance in the preceding movement. But the effort to cover a long distance is certainly desirable and is characteristic of a mature reader. Compare the record of this reader with that of Subject E3, shown in Plate VI. This subject made 29 regressive movements, and the ten longest eye-movements preceding them are as follows: 8–6–5–5–4–4–4–4–4 and 3. It cannot be said that this subject needed to make backward movements because he attempted too much. His regressive movements were caused by an entirely different reason, and they must be classified as a different type from those of Subject E6.

Such facts as the above make it clear that regressive movements cannot be treated as if they were all of the same nature. They must be analyzed into their various types and each type treated separately. For the purpose of this study, those regressive movements are most important which are caused by the eye attempting to cover too much and failing in the attempt. It would be expected that a reader having a wide eye-voice span would make a larger proportion of this type of regressive movements than of any other. Accordingly a comparison was made to see what relation existed.

The records of each of the subjects were studied and the length of each eye-movement-just-preceding-a-regressive-movement was tabulated. It was found that, for the elementary subjects, the good readers had an average length of this eye-movement of 8.6 letter-spaces as compared with 5.7 spaces for the poor readers. This led to a further analysis of the material. A tabulation of the average length of the eye-movements-just-preceding-regressive-movements for all fifty-four subjects showed that the median length of these movements was 7 letter-spaces and that the upper quartile included all averages greater than 8 letter-spaces. Since this analysis is concerned only with regressive movements which are caused by the eye attempting too great a movement, the eye-movements falling in this upper quartile, those 9 or more letter-spaces in length, were selected for study. Accordingly, a tabulation was made of the percentage of those eye-movements which were 9 or more letter-spaces in length. Since all of these eye-movements were among the upper 25 per cent of the total in length, the regressive movements following them can be attributed to an attempt to make too long a movement of the eye. A comparison can therefore be made showing the relation of eye-voice span to this particular type of regressive movement.

This comparison is shown by Table XII and Figure 11. In this table the first column gives the number of subjects in each division. The second column gives the percentage of eye-movements-just-preceding-regressive-movements 9 or more letter-spaces in length. The third column gives the average eye-voice span for those subjects corresponding to each percentage. The table should be read as follows: There are 16 subjects having from 0 to 9 per cent of their eye-movements-just-preceding-regressive-movements 9 or more letter-spaces in length, and their average eye-voice span is 10.5 letter-spaces; there are 3 subjects having from 10 to 19 per cent of their eye-movements-just-preceding-regressive-movements 9 or more letter-spaces in length, and their average eye-voice span is 7.9 letter-spaces. Figure 11 shows the data graphically. The dotted part at the upper end of the curve signifies that only a limited number of subjects, one for each position, is represented. The dotted line at the beginning of the curve signifies that the first figure is a complex and needs further analysis. Some of the subjects having from 0 to 9 per cent of their eye-movements-just-preceding-regressive-movements 9 or more letter-spaces in length should not properly be used. There are five good readers having 0 per cent of these long eye-movements because they have only a few regressive movements of any kind. These five subjects have an average of less than one regressive movement per line. With this allowance for the first number, the curve is a true representation of the relation of the eye-voice span to the regressive movements caused by too long an eye-movement-just-preceding-a-regressive-movement.

TABLE XII

RELATION OF EYE-VOICE SPAN TO EYE-MOVEMENTS-JUST-PRECEDING-REGRESSIVE-MOVEMENTS—ALL SUBJECTS

Number of Subjects	Percentage of Regressive Movements Preceded by Very Long Eye-Movements	Average Eye-Voice Span
16	0–9	10.5
3	10–19	7.9
9	20–29	10.7
5	30–39	11.5
8	40–49	14.9
6	50–59	16.6
5	60–69	16.0
1	70–79	13.7
1	80–89	13.9

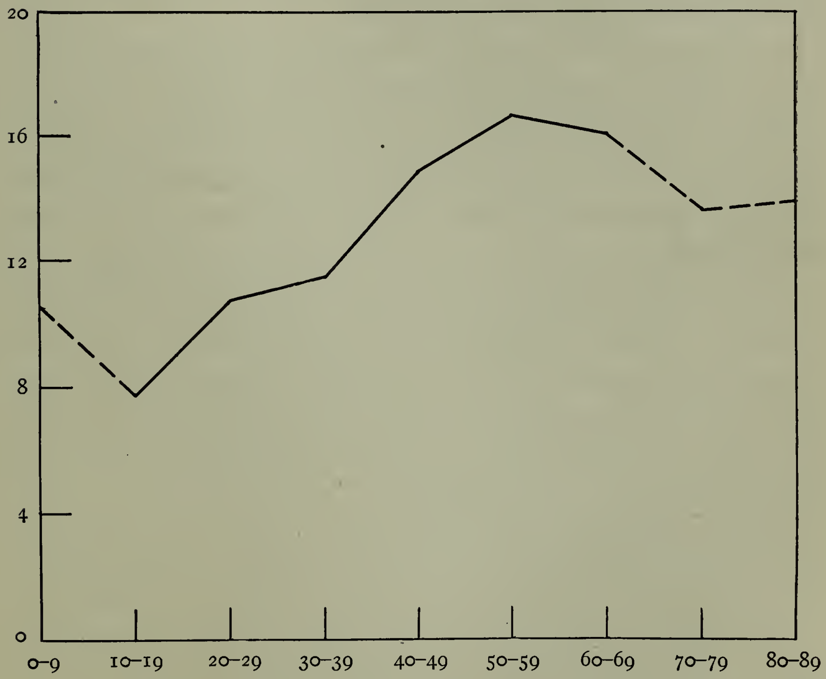


FIG. 11.—Relation of eye-voice span to eye-movements-just-preceding-regressive-movements—all subjects. Average eye-voice span on vertical axis. Percentage of very long eye-movements-just-preceding-regressive-movements on horizontal axis.

This correlation makes it clear that this type of regressive movement is an indication of mature reading habits, and that it is a characteristic of good readers to risk a long eye-movement. It also makes it clear that the regressive movements of subjects having a wide eye-voice span are caused in a greater percentage of cases by attempting a long eye-movement, while those regressive movements of subjects having a narrow eye-voice span are caused more often by confusion in reading and other unanalyzed difficulties. In the first case the regressive movements are sacrifices made in an effort to use a longer eye-movement; in the second case they are in most instances merely attempts to correct difficulties which should never exist and which are not common among mature readers.

SUMMARY OF ANALYSIS OF EYE-VOICE SPAN

The relations of the eye-voice span to other factors of reading as described in this chapter may be summarized as follows:

1. There is a positive correlation between a wide eye-voice span and mature reading. The average span for good readers is greater than that of poor readers in every school grade.

2. The development of the eye-voice span through the school period does not show a consistent increase from grade to grade, but is very irregular. The average span for the high school is greater than that of the elementary school. The average span of the adult subjects is greater than that of those from the high school. But some good readers from the elementary school have a span greater than most of the high-school subjects.

3. The width of the eye-voice span shows little correlation with position in the line, except that the span at the end of a line is slightly narrower. A high correlation is shown between eye-voice span and position in the sentence. The average width of the span at the beginning of a sentence is greater than at the end of the sentence by 46 per cent, while the average within the sentence is greater than that at the end by 23 per cent. These percentages are for all fifty-four subjects including both good and poor readers.

4. A comparison of reading rate with eye-voice span shows that rate of reading and width of eye-voice span increase together. There is a high positive correlation between these two factors of reading.

5. A negative correlation exists between the eye-voice span and the number of fixations per line. As the span increases in width the number of fixations per line decreases.

6. Little correlation is evident between eye-voice span and the number of regressive movements per line. However if the regressive movements are analyzed into their various types, a positive correlation is shown between eye-voice span and that type of regressive movements caused by too long a forward sweep of the eye. As the width of the eye-voice span increases, the percentage of regressive movements caused by this habit of attempting a long forward movement increases. This type of regressive movements must be considered as a characteristic of mature reading.

This study shows that a wide eye-voice span occurs in common with good quality of reading, rapid rate of reading, a small number of fixations per line, and a certain type of regressive movements. All of these qualities may be described as characteristic of a mature reader. It is also evident from the data shown that a narrow eye-voice span occurs with a poor quality of reading, a slow rate, a large number of fixations per line, and a larger percentage of a type of regressive movements which are not characteristic of good reading. These qualities may be considered as characteristic of persons whose reading habits are immature.

The results of the preceding analysis make it very clear that the development of a wide eye-voice span is a significant element in oral reading. As will be shown later, in silent reading a similar meaning-recognition span exists which appears to be closely related, in its development, to the eye-voice span. Since the width of eye-voice span is a factor of mature reading it should receive very definite attention in methods of teaching reading. However, it is difficult to find any allusion to the subject in any of the method texts or manuals. No evidence can be found that elementary teachers in the public schools give any attention to the problem in their teaching, probably because no specific methods are available for dealing with it. Expert teachers of primary reading have worked out a few devices, based upon rapid scanning of phrases and the use of familiar material, which they use in their own classes, but they say that there is nothing available in the literature of reading methods which deals specifically with training for a wider eye-voice span. It is not the function of this investigation to devise methods of teaching, but it is in place to state that here is a significant factor of reading which is in need of specific training methods. The problem is to devise methods which will develop a habit of pushing the eye farther ahead of the voice in order that there may be an interpretation of meaning in larger units.

CHAPTER III

CONTINUOUS RELATIONSHIP OF EYE AND VOICE

In the preceding chapter an analysis was made of the characteristics of the eye-voice span at certain positions in the selections used. It is desirable to know the characteristics of the span at every word and every fixation rather than simply at intervals through a paragraph. Such an analysis is of interest for two reasons: first, it shows the continuous relationship of the eye and voice and the manner in which the variations in the width of the span take place, and secondly, it explains in a measure, the behavior of the eye during the very long fixation pauses which occasionally occur. Such an analysis as just described will be presented in this chapter.

METHOD

It has been explained that a dictaphone record was taken of the oral reading of each subject at the time the eye-movements were photographed. By means of the electric bell and reversed camera shutter, described in the introduction, it was possible to synchronize the voice with the eye-movement record on the film. By this means the position of the eye and voice at the same instant could be determined at intervals through the reading. These locations were shown in the plates in the preceding chapter. By using these locations as basic points, the relation of the eye and voice at any succeeding point could be determined by measuring equal units of time from these bases. The installation of a special spring motor in the dictaphone, which runs with uniform speed from revolution to revolution, insures accuracy for the voice measurement. The measurement of time for the eye is accomplished by adding together the duration of the fixations, while for the voice it is measured by taking the time with a stop-watch from the basic points to each of the following words as they are pronounced on the dictaphone record. This method will be made clear in the next paragraph by reference to a diagram in one of the plates.

Plate XXI shows the record of Subject H1, a good reader from the freshman class. The selection has been duplicated in parallel lines in order to show the eye-voice relationship more clearly. The upper line of the pairs may be called the eye-line, and shows the position and duration of eye-fixations in the same manner as in all of the preceding plates. The lower line of the pairs may be called the voice-line. The diagonal lines connect the positions of the eye and voice for every fixation.

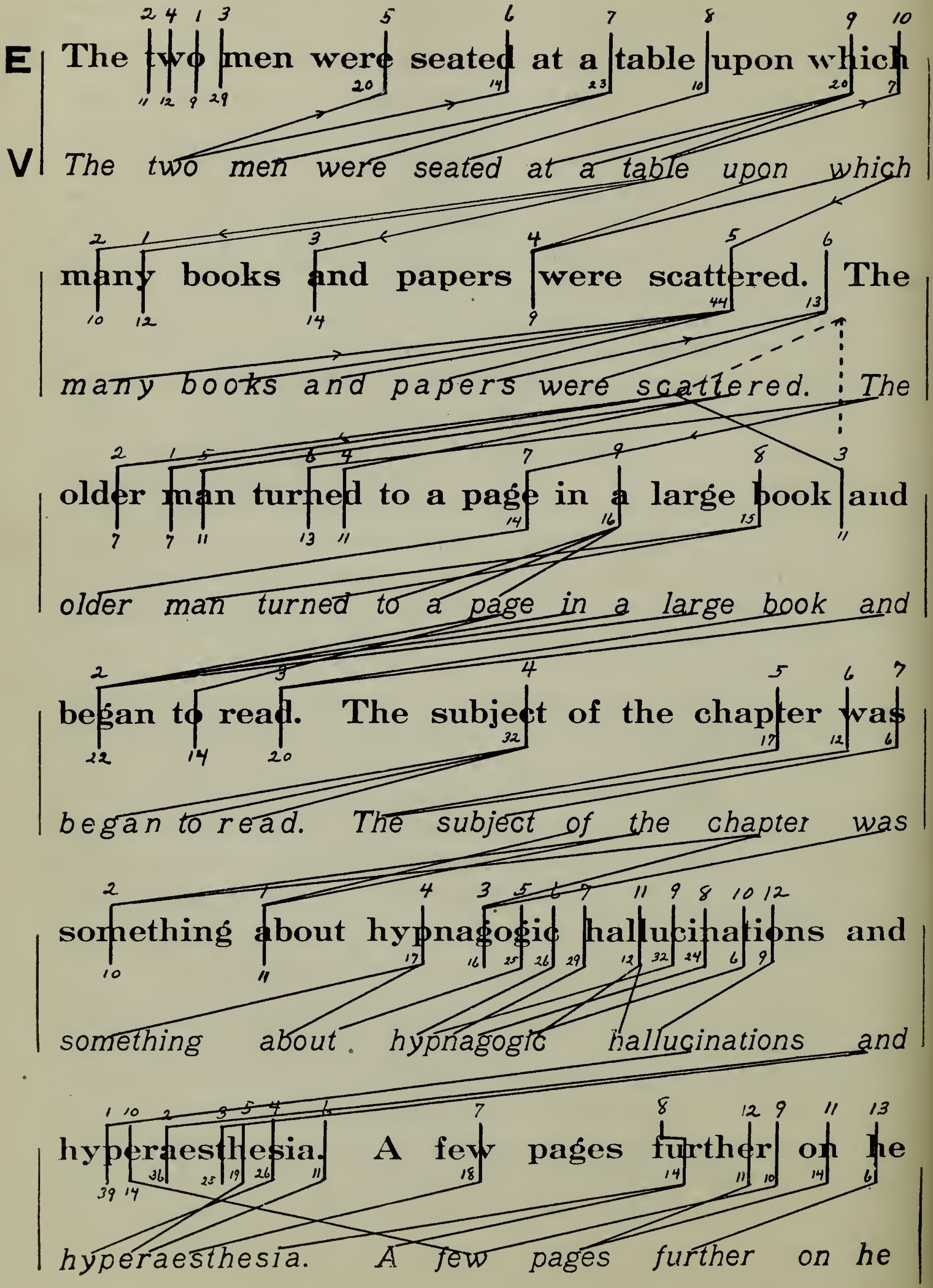
In the record shown in Plate XXI, the positions of the eye and voice were synchronized first as the voice was pronouncing the word "two" in line 1. As the voice began to pronounce "two" the eye was fixated on the last letter of the word "were," which is the fifth fixation in the line. These two points may therefore be taken as a base of measurement for the determination of the relative positions of the eye and voice at the succeeding words and fixations. It will be observed by reference to the plate, that 34 (20+14) fiftieths of a second elapsed during fixations 5 and 6. The time on the stop-watch showed that at a point 34 fiftieths of a second after beginning to pronounce "two," the voice had not begun to pronounce the next word, indicating that fixations 5 and 6 were both made during the time used by the voice in reading the word "two." From fixation 5 to the end of fixation 7 a time of 57 (20+14+23) fiftieths of a second elapsed. The record from the stop-watch and the dictaphone showed that during the interval from 34 fiftieths of a second to 57 fiftieths, the voice had pronounced the words "men" and "were." By a continuation of this form of analysis, the relative positions of the eye and voice were located for every word and every fixation.

The accuracy of the dictaphone time record was made possible by the installation of a special motor which runs with constant speed from revolution to revolution. Only a limited number of subjects were given this form of analysis because of the fact that the method is exceedingly tedious and time-consuming, and also because such a form of analysis can only be applied to film and dictaphone records which are perfect in every detail. The records of nine subjects are shown in Plates XXI–XXIX.

EXPLANATION OF TYPICAL PLATES

The plates may be interpreted either with reference to the eye-line or the voice-line. Arrow heads are inserted for the first few lines of Plate XXI indicating the direction of the eye fixations from the location of the voice. This plate should be read by following the voice-line. While the voice was pronouncing the word "two" the eye was covering fixations 5 and 6, as shown by following the diagonal lines leading from "two." While the voice was pronouncing "men" the eye was located

PLATE XXI


E
V
The two men were seated at a table upon which
The two men were seated at a table upon which
many books and papers were scattered. The
many books and papers were scattered. The
older man turned to a page in a large book and
older man turned to a page in a large book and
began to read. The subject of the chapter was
began to read. The subject of the chapter was
something about hypnagogic hallucinations and
something about hypnagogic hallucinations and
hyperaesthesia. A few pages further on he
hyperaesthesia. A few pages further on he

Continuous eye-voice relationship, Subject H1

PLATE XXIa

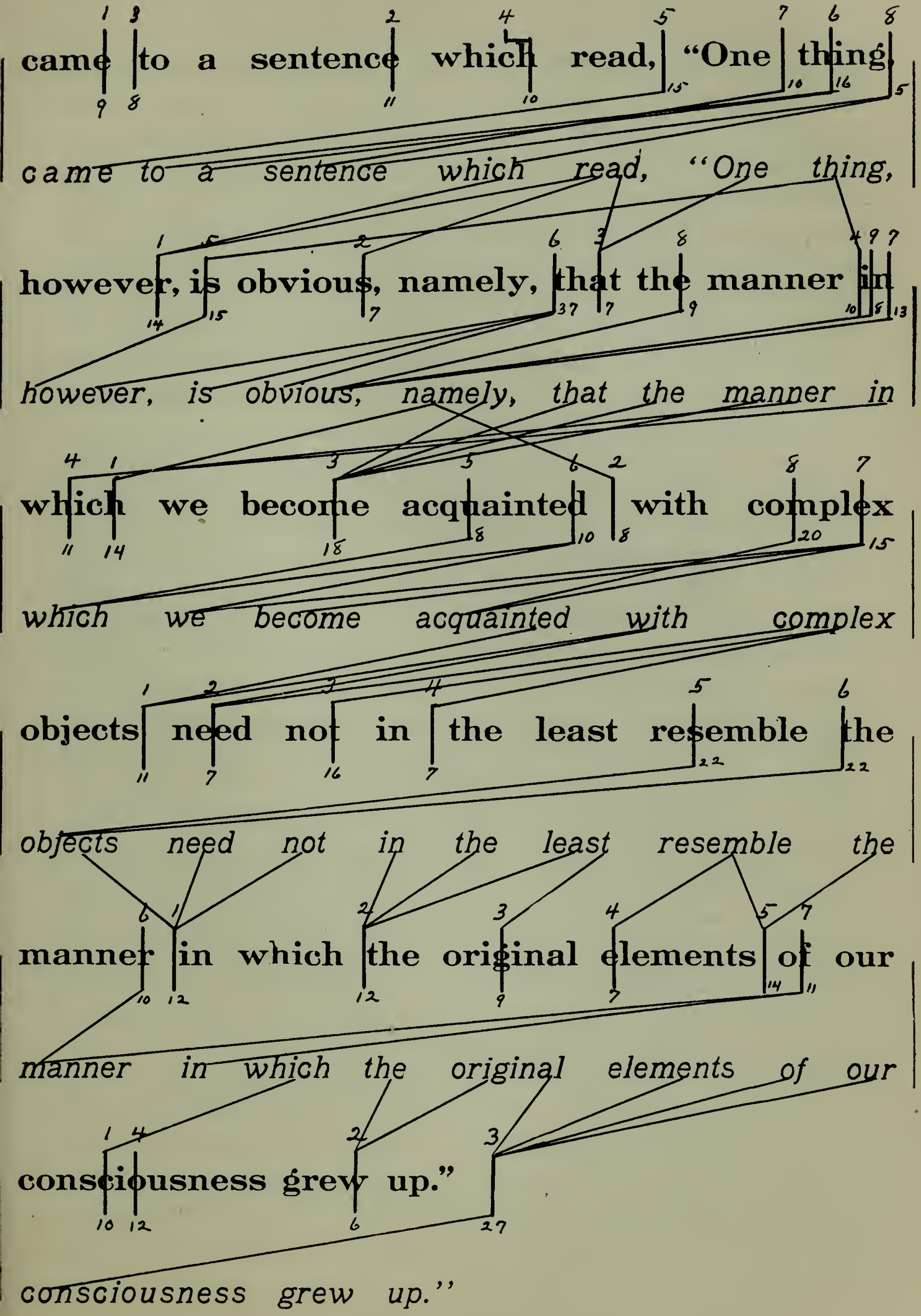

came to a sentence which read, "One thing,
came to a sentence which read, "One thing,
however, is obvious, namely, that the manner in
however, is obvious, namely, that the manner in
which we become acquainted with complex
which we become acquainted with complex
objects need not in the least resemble the
objects need not in the least resemble the
manner in which the original elements of our
manner in which the original elements of our
consciousness grew up."
consciousness grew up."

PLATE XXI—*Continued*

at fixation 7. As the voice was saying "were" the eye was still located at fixation 7. While the voice was pronouncing the word "seated" the eye was fixated at 8. While the voice was saying "at," "a," and the first part of "table," the eye was located at the ninth fixation, but before the voice finished "table" and started on the next word the eye had moved on to fixation 10 in the first line and then to fixations 1, 2, and 3 in the second line. The voice was evidently lagging at this point. As the voice was pronouncing "upon" and the first part of "which," the eye was at the fourth fixation of the second line. While the voice was finishing the word "which" and saying "many books and papers," the eye was held steadily at the fifth fixation in the second line. This fixation was much longer than the average, lasting for 44 fiftieths of a second. The voice moved over all or part of five words during this fixation, making the eye-voice span at the end of the fixation 22 letter-spaces narrower than it was at the beginning.

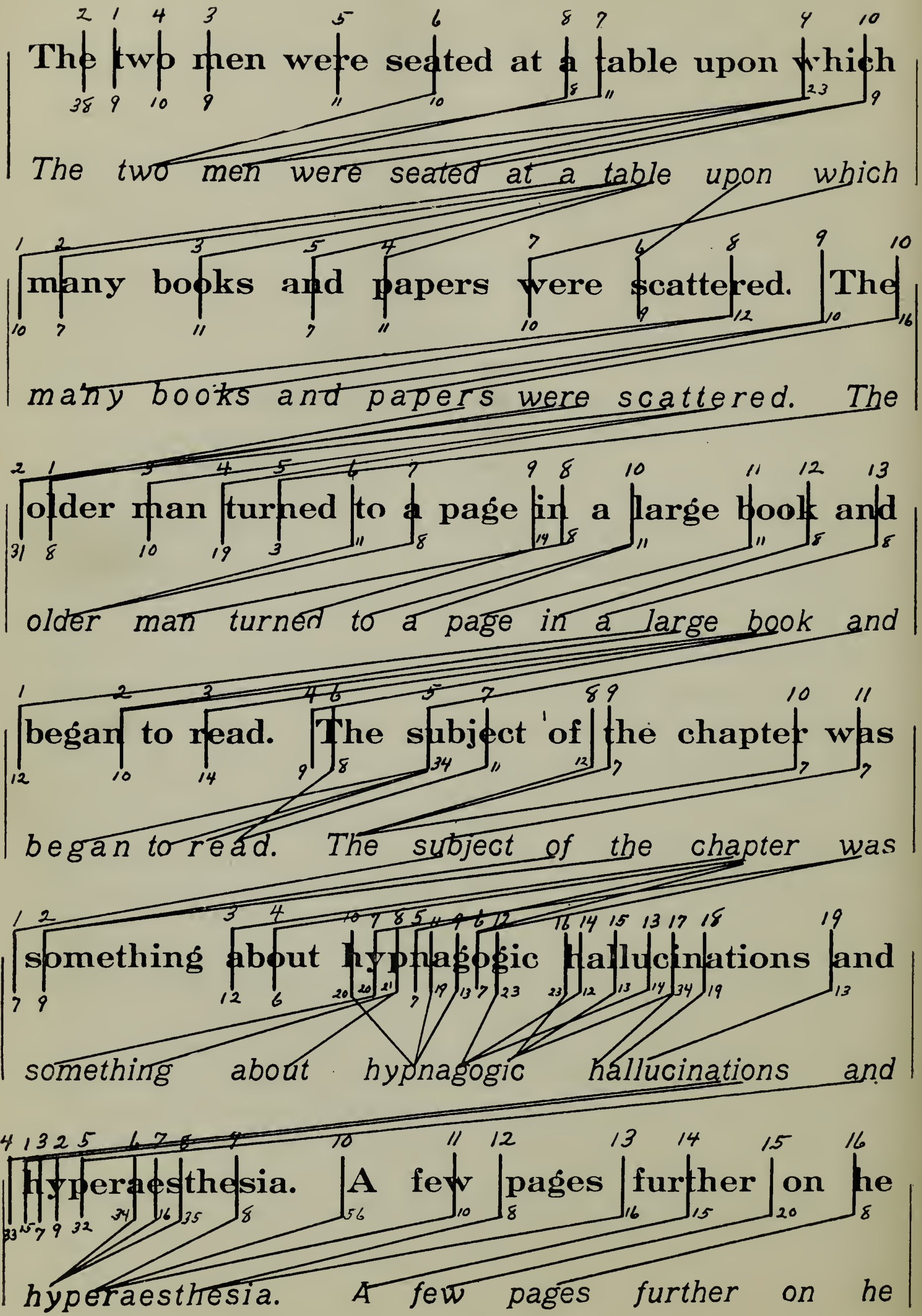
All of the plates are to be read in the same manner. The positions of the eye, while the voice is pronouncing any word, may be found by following the diagonal lines leading from that particular word to the eye-fixations. The position of the voice, while the eye is at any fixation, may be likewise determined by following the diagonal lines leading from that particular fixation to the words in the voice-line. The length of the eye-voice span may be found by counting the number of letter-spaces in the interval between the position of the voice and the eye. If the voice moves over more than one word during a single fixation there will be a maximum and a minimum span, with a range between the spans equal to the distance covered by the voice while the eye is stationary. This maximum and minimum span is well illustrated in the second line of Plate XXI. At fixation 5 in this line the eye remained fixated while the voice covered several words. From the position of the voice to that of the eye at the beginning of the fixation there is a span of 36 letter-spaces, while the distance between the voice and the eye at the end of the fixation is only 14 letter-spaces. In this case the maximum span is 36, the minimum span is 14, and the range of the movement of the voice during the fixation is 22 letter-spaces. The average span at this position would be 25 letter-spaces.

In the third line of Plate XXI an infrequent type of eye-movement occurs which will need explanation. Between the second and fourth fixations in this line the eye made a long sweep to the right, placing the third fixation nearly at the end of the line. An examination of the film will show that there was also an upward movement of the eye, which indicates that instead of fixation 3 being a long look ahead, it was really a regressive movement back to the end of the preceding line. This is indicated in the plate by dotted lines, showing that while this fixation occurred during the series for line 3, it was properly a fixation back upon line 2. This type of movement occurred at intervals in the reading of many of the subjects.

A comparison of the records in Plates XXI–XXIX will bring out the many variations in eye-voice relationship, and will also show the points of general similarity. The elastic nature of the eye-voice span is clearly indicated and the effect of position in the sentence and line can be observed in detail. The effect of the three difficult words introduced in lines 5 and 6 is quite marked, causing an immediate break in the habitual eye-voice relation and reducing the span to nearly zero.

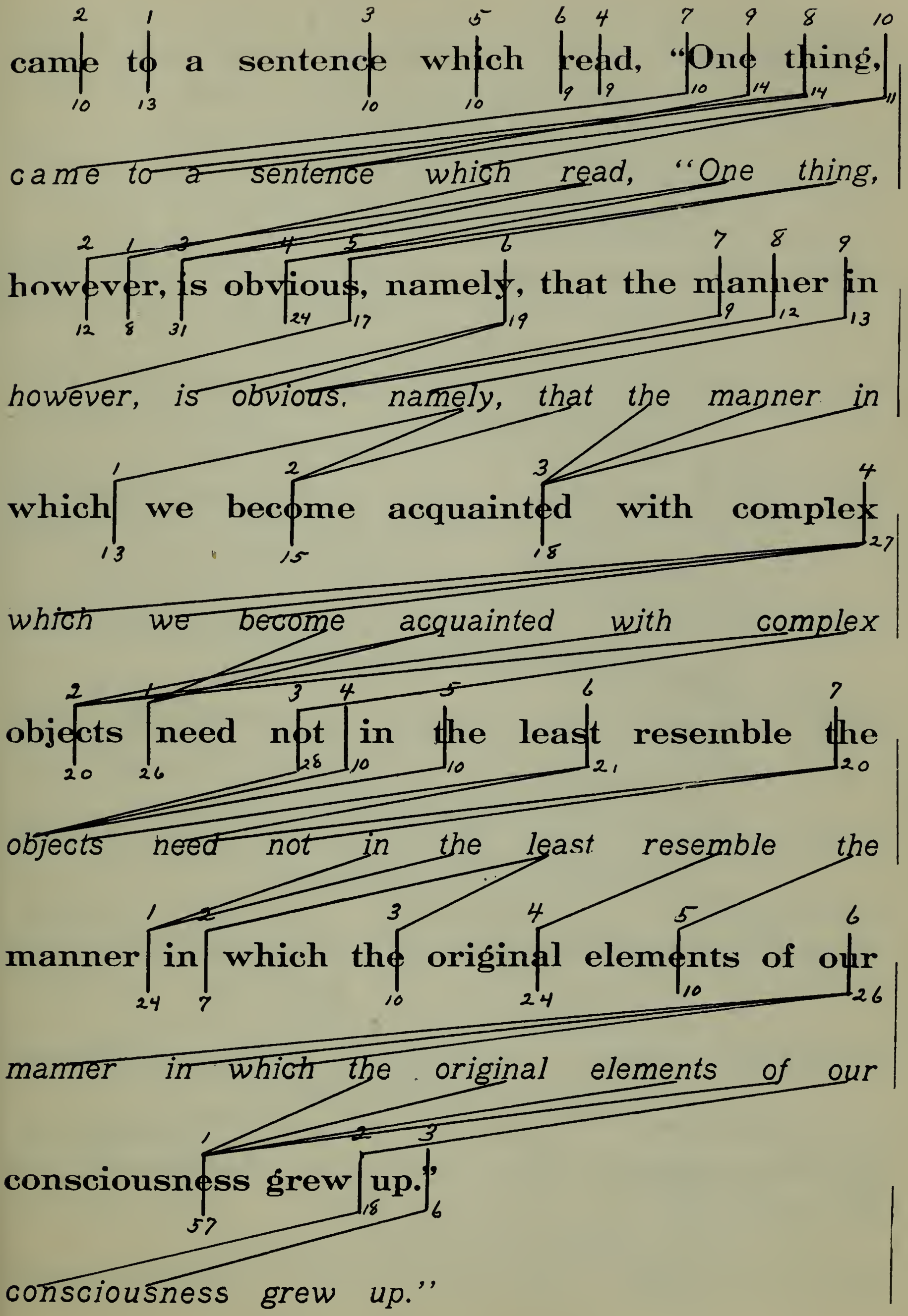
An opportunity is afforded here to check the validity of the method of computing the average span from a few positions in the selection, as was done in the preceding chapter. A comparison shows that when the average span for every fixation is used, the average span for the selection is a little wider than when computed from the eight or nine positions in the paragraph. For Subjects H1 and E1, Plates XXI and XXVIII, the average span obtained by using every fixation was 3.2 letter-spaces longer than when averaged from the nine positions in the paragraph. The reason for this difference is easily explained. The average eye-voice span for the end of a sentence was found to be much narrower than for other points in the selection. For the eight positions used in the elementary-school selection, two were at or near the end of a sentence. The average for the selection, therefore, was influenced by 25 per cent of the samples representing eye-voice spans which varied from the average more than did the other 75 per cent. In the whole elementary selection there were only three sentences and consequently only a few words influenced by being in that position. However, there were forty-three words in the entire selection, which very materially reduced the influence which the narrower span, at the end of sentences, would have on the general average. The same would be true for the high-school selection. Since it has been shown that the relative shortening of the span at the end of a sentence is more evident with good than with poor readers, and since both Subjects H1 and E1 are good readers, the error in the averages for the poor readers would be still less than for these two subjects. Whatever small amount of error does exist for the sampling method, it would affect the results of the preceding chapter in only one respect: it would slightly enlarge the difference in the width

PLATE XXII


The two men were seated at a table upon which
many books and papers were scattered. The
older man turned to a page in a large book and
began to read. The subject of the chapter was
something about hypnagogic hallucinations and
hyperaesthesia. A few pages further on he

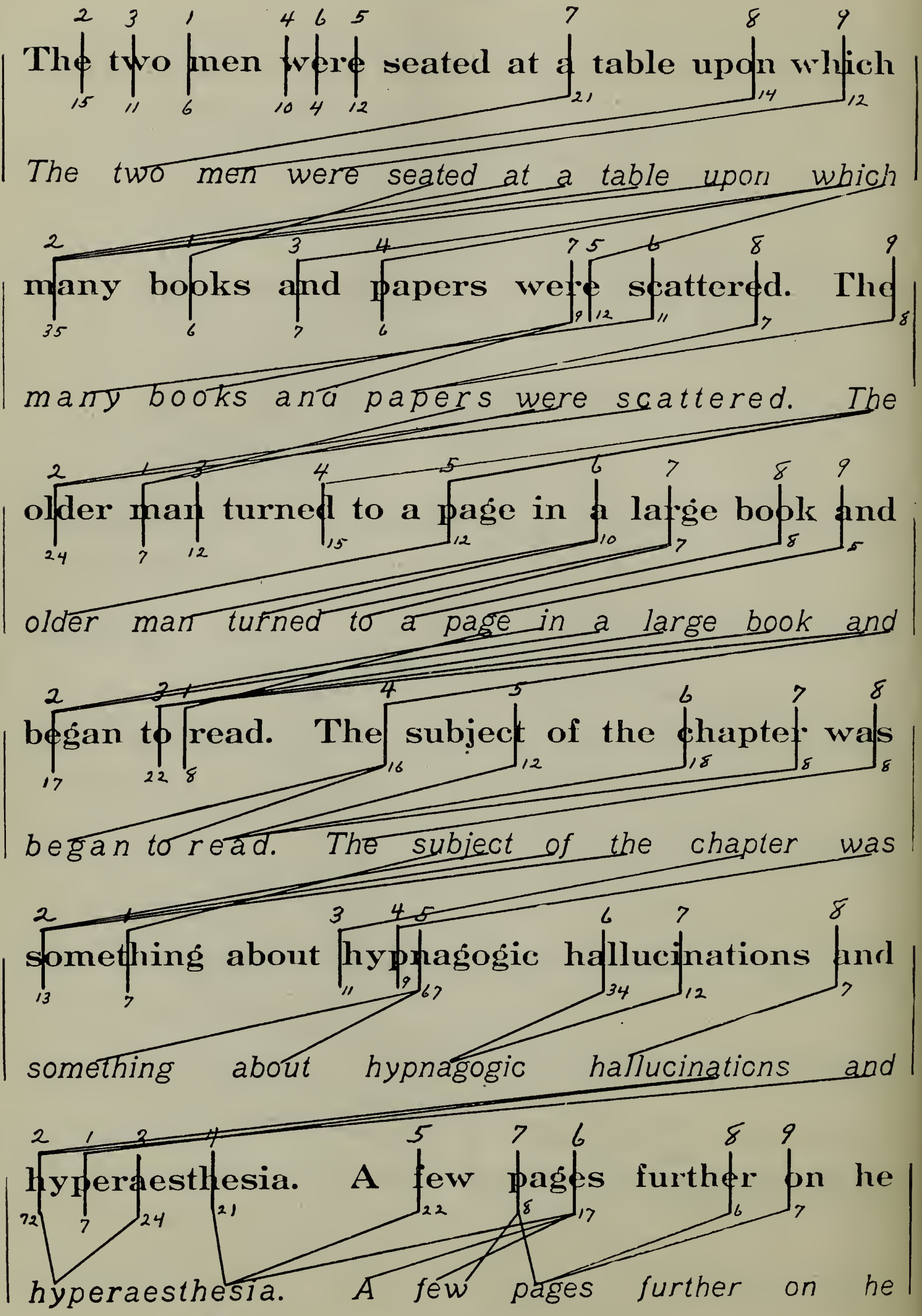
Continuous eye-voice relationship, Subject H5

PLATE XXIII


came to a sentence which read, "One thing,
came to a sentence which read, "One thing,
however, is obvious, namely, that the manner in
however, is obvious, namely, that the manner in
which we become acquainted with complex
which we become acquainted with complex
objects need not in the least resemble the
objects need not in the least resemble the
manner in which the original elements of our
manner in which the original elements of our
consciousness grew up."
consciousness grew up."

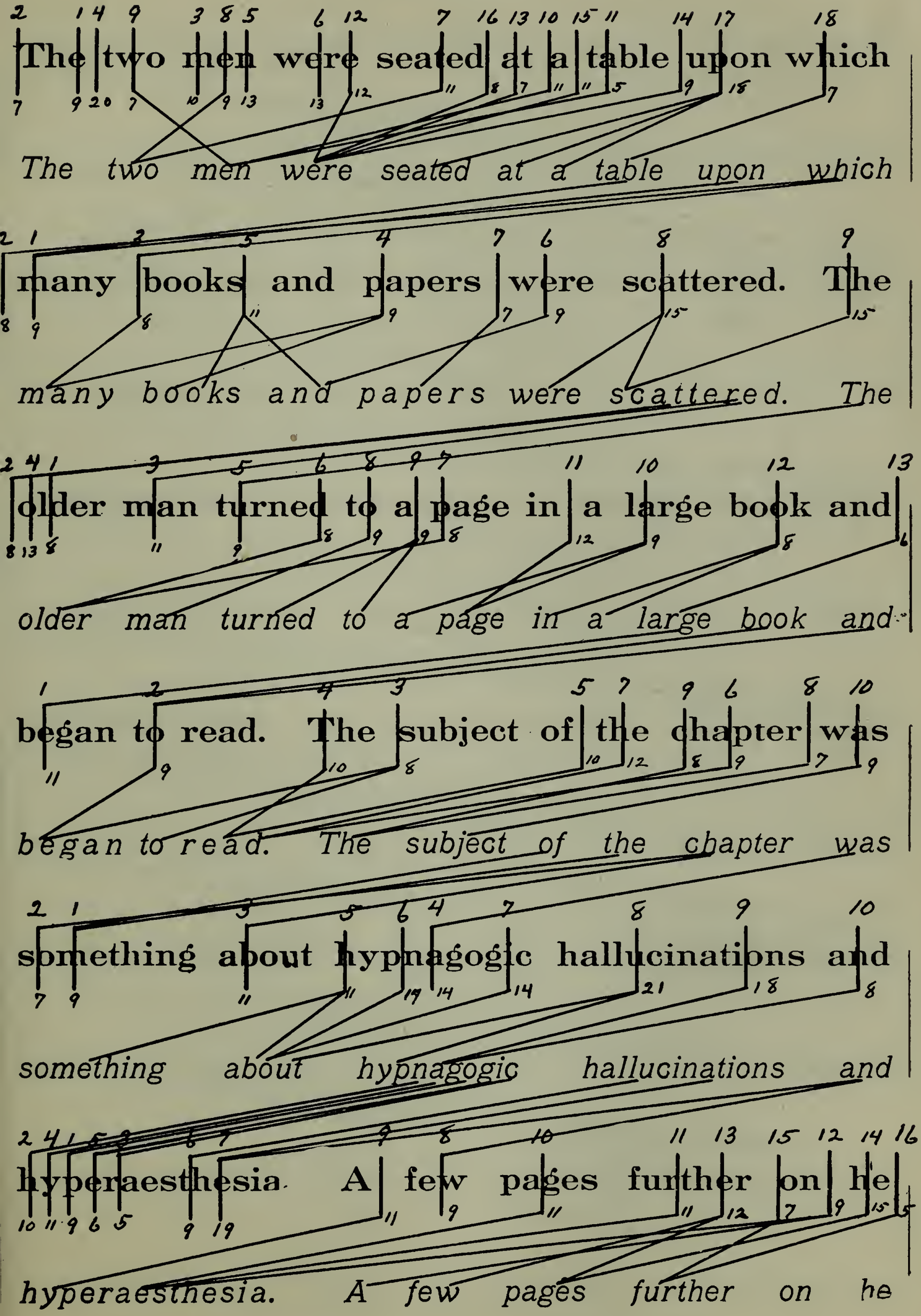
Continuous eye-voice relationship, Subject H8

PLATE XXIV


2 3 1 4 6 5 7 8 9
The two men were seated at a table upon which
15 11 6 10 4 12 21 14 12
The two men were seated at a table upon which
2 1 3 4 7 5 6 8 9
many books and papers were scattered. The
35 6 7 6 9 12 11 7 8
many books and papers were scattered. The
2 1 3 4 5 6 7 8 9
older man turned to a page in a large book and
24 7 12 15 12 10 7 8 5
older man turned to a page in a large book and
2 3 1 4 5 6 7 8
began to read. The subject of the chapter was
17 22 8 16 12 18 8 8
began to read. The subject of the chapter was
2 1 3 4 5 6 7 8
something about hypnagogic hallucinations and
13 7 11 9 67 34 12 7
something about hypnagogic hallucinations and
2 1 3 4 5 7 6 8 9
hyperaesthesia. A few pages further on he
72 7 24 21 22 8 17 6 7
hyperaesthesia. A few pages further on he

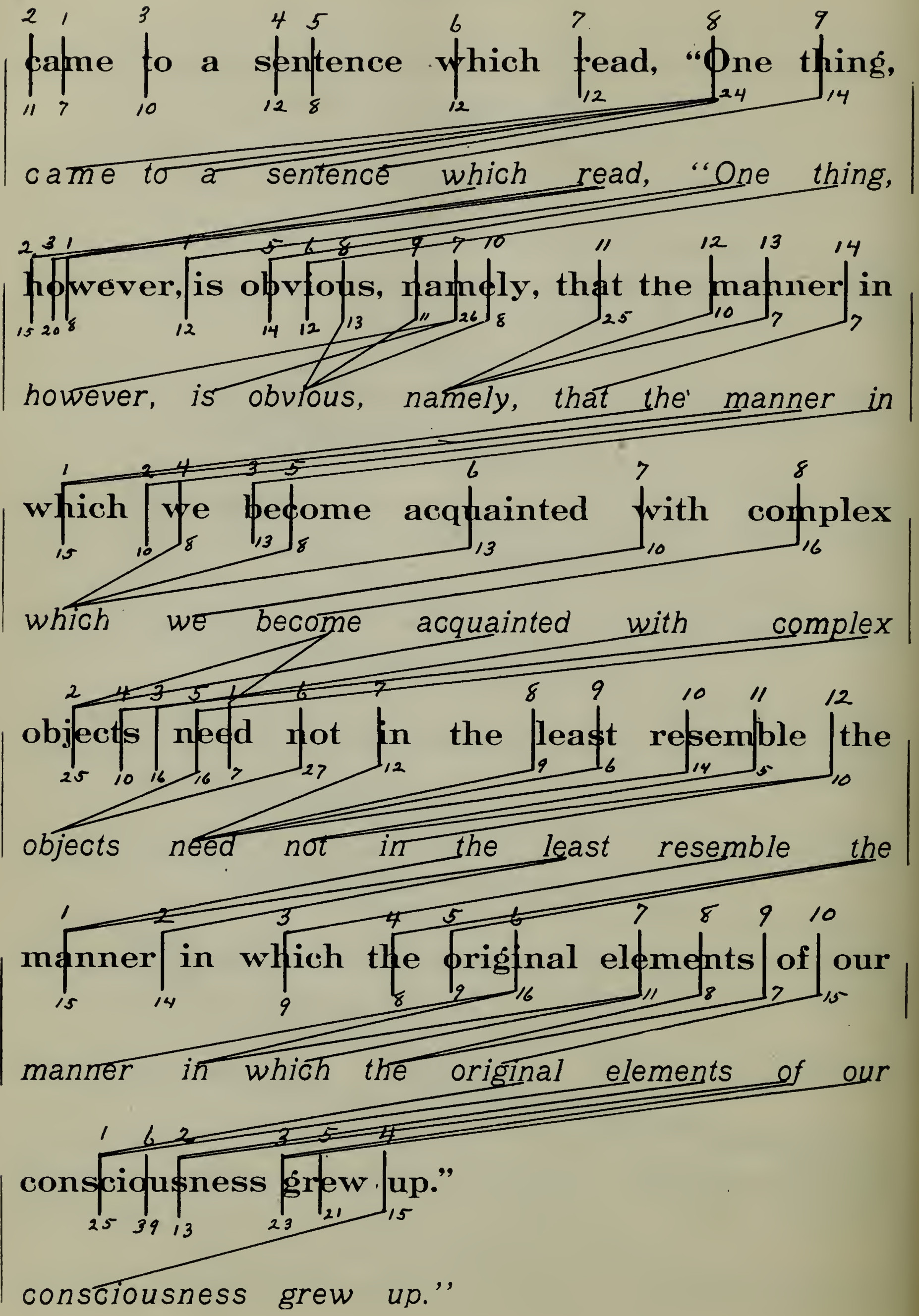
Continuous eye-voice relationship, Subject H10

PLATE XXV


The two men were seated at a table upon which
many books and papers were scattered. The
older man turned to a page in a large book and
began to read. The subject of the chapter was
something about hypnagogic hallucinations and
hyperaesthesia. A few pages further on he

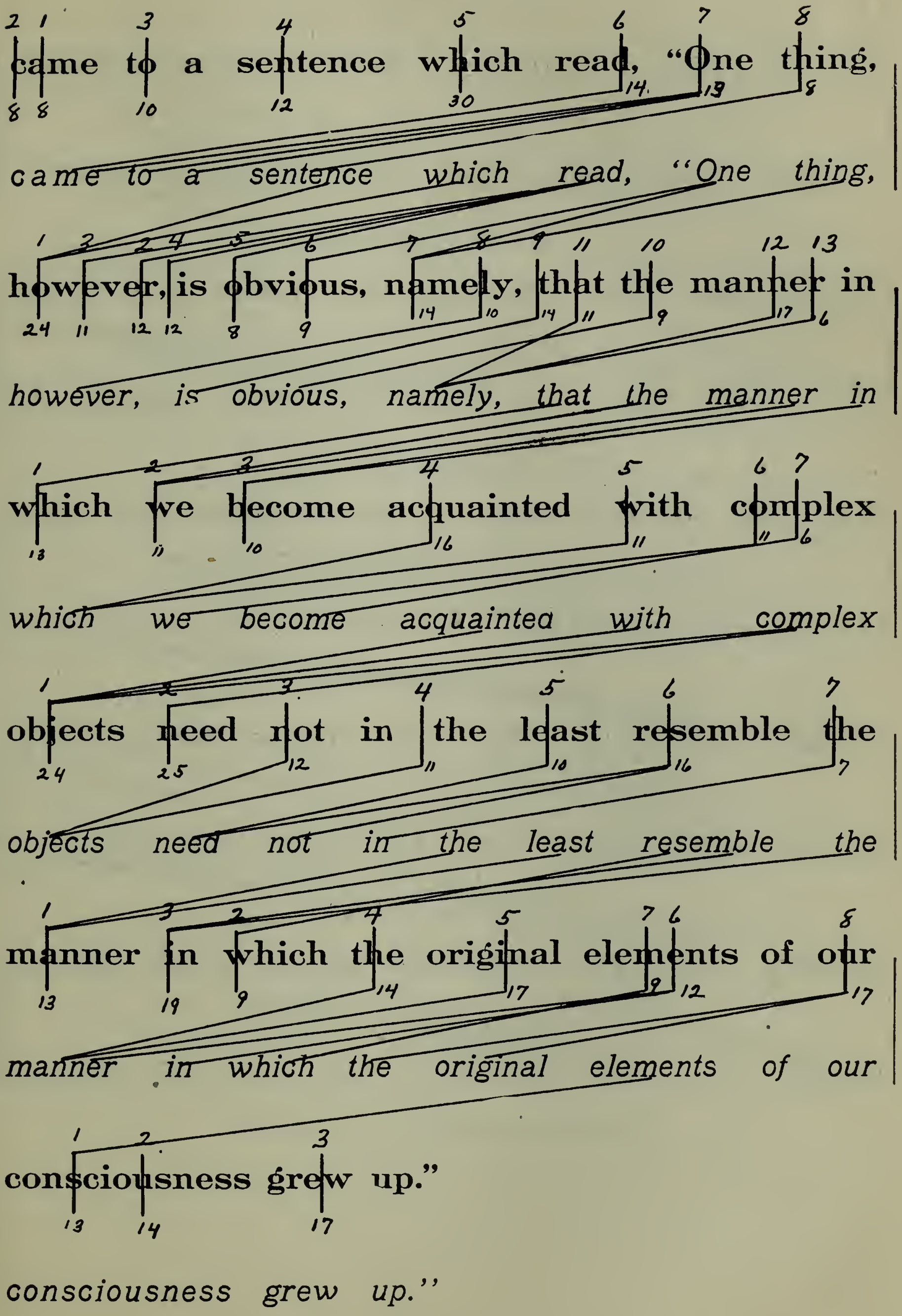
Continuous eye-voice relationship, Subject H22

PLATE XXVI


came to a sentence which read, "One thing,
came to a sentence which read, "One thing,
however, is obvious, namely, that the manner in
however, is obvious, namely, that the manner in
which we become acquainted with complex
which we become acquainted with complex
objects need not in the least resemble the
objects need not in the least resemble the
manner in which the original elements of our
manner in which the original elements of our
consciousness grew up."
consciousness grew up."

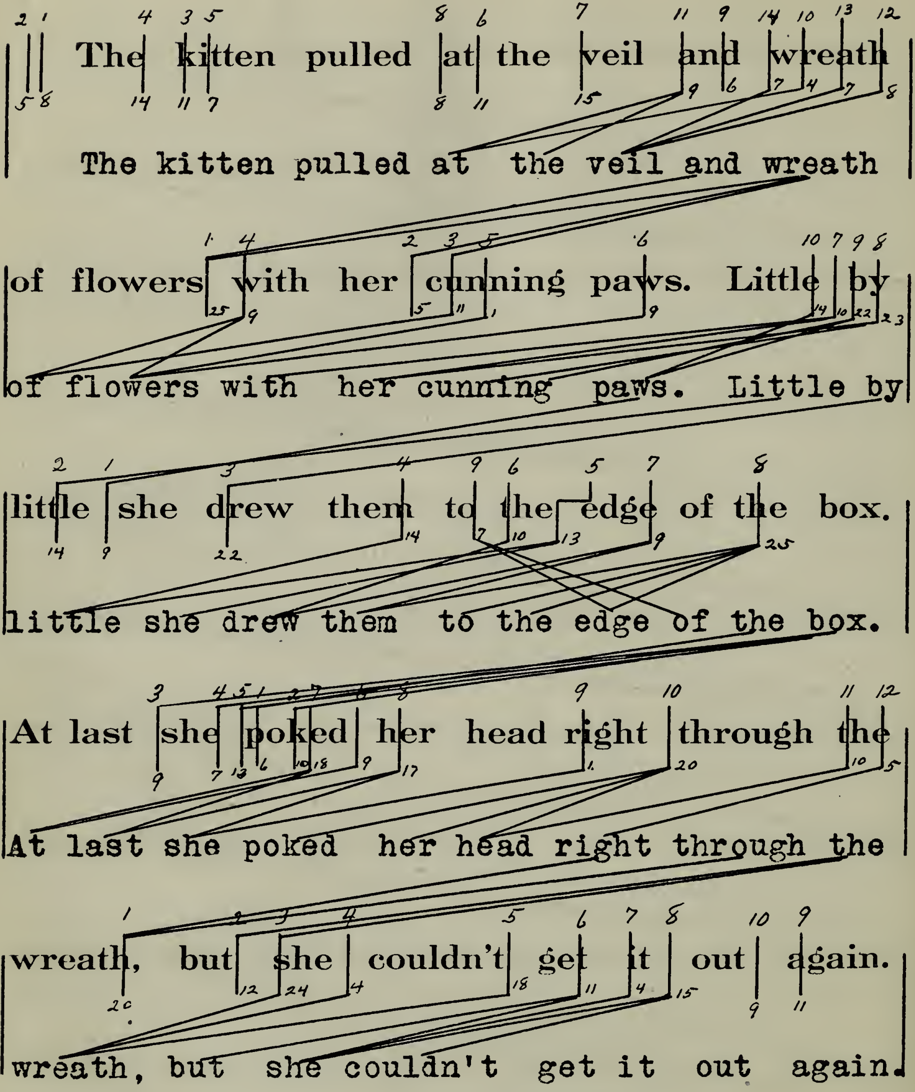
Continuous eye-voice relationship, Subject H23

PLATE XXVII


came to a sentence which read, "One thing,
came to a sentence which read, "One thing,
however, is obvious, namely, that the manner in
however, is obvious, namely, that the manner in
which we become acquainted with complex
which we become acquainted with complex
objects need not in the least resemble the
objects need not in the least resemble the
manner in which the original elements of our
manner in which the original elements of our
consciousness grew up."
consciousness grew up."

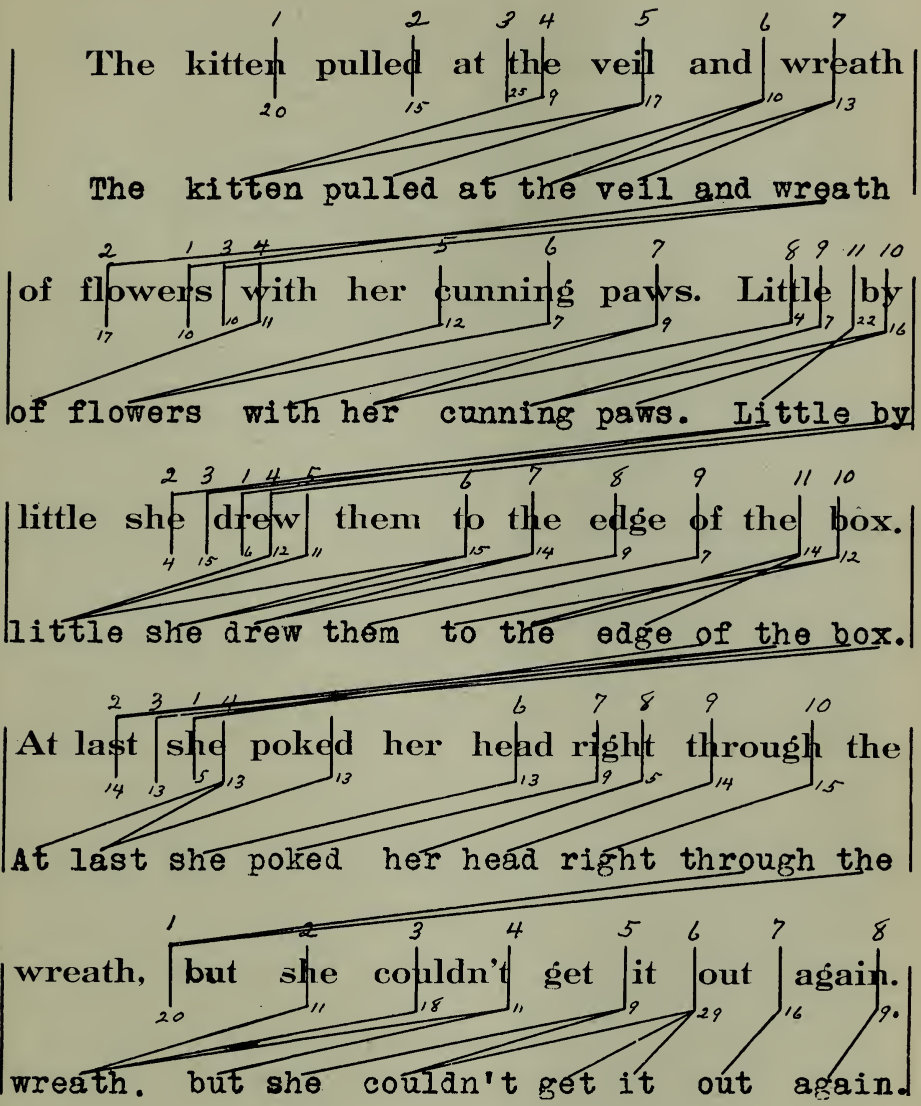
Continuous eye-voice relationship, Subject A3

PLATE XXVIII


The kitten pulled at the veil and wreath
The kitten pulled at the veil and wreath
of flowers with her cunning paws. Little by
of flowers with her cunning paws. Little by
little she drew them to the edge of the box.
little she drew them to the edge of the box.
At last she poked her head right through the
At last she poked her head right through the
wreath, but she couldn't get it out again.
wreath, but she couldn't get it out again.

Continuous eye-voice relationship, Subject E1

PLATE XXIX


1 2 3 4 5 6 7
The kitten pulled at the veil and wreath
20 15 25 9 17 10 13
The kitten pulled at the veil and wreath
2 1 3 4 5 6 7 8 9 11 10
of flowers with her cunning paws. Little by
17 10 10 11 12 7 9 4 7 22 16
of flowers with her cunning paws. Little by
2 3 1 4 5 6 7 8 9 11 10
little she drew them to the edge of the box.
4 15 6 12 11 15 14 9 7 14 12
little she drew them to the edge of the box.
2 3 1 4 6 7 8 9 10
At last she poked her head right through the
14 13 5 13 13 13 9 5 14 15
At last she poked her head right through the
1 2 3 4 5 6 7 8
wreath, but she couldn't get it out again.
20 11 18 11 9 29 16 9
wreath. but she couldn't get it out again.

Continuous eye-voice relationship, Subject E5 of span which was shown to exist between the good and the poor readers. It would have no influence on the other results since they are all in the nature of relative comparisons and whatever difference exists would exist for the whole group.

ELASTIC NATURE OF THE EYE-VOICE SPAN

One of the characteristic features of the eye-voice span is its variation in width from word to word through the selection. The span is sometimes very wide and sometimes narrow, apparently expanding and contracting according to the demands made by the material read. Table XIII shows this elastic nature of the span for four lines of the reading of Subject H1. This table gives the maximum and the minimum eye-voice span, the range, and the duration of the pause for each

TABLE XIII

Elasticity of Eye-Voice Span—Subject H1

Line and Fixation Number	Maximum Eye-Voice Span	Minimum Eye-Voice Span	Range of Span	Length of Fixation
II–1	18	17	1	12
II–2	15	14	1	10
II–3	24	23	1	14
II–4	32	25	7	9
II–5	36	13	23	44
II–6	18	10	8	13
III–1	21	19	2	7
III–2	16	14	2	7
III–3	7	5	2	11
III–4	24	22	2	11
III–5	14	11	3	11
III–6	17	15	2	13
III–7	27	19	8	14
III–8	32	21	11	15
III–9	13	6	7	16
IV–1	30	29	1	14
IV–2	24	11	13	22
IV–3	21	12	9	20
IV–4	24	10	14	32
IV–5	24	23	1	17
IV–6	26	23	3	12
IV–7	25	17	8	6
XI–1	44	34	10	12
XI–2	41	31	10	12
XI–3	39	37	2	9
XI–4	45	41	4	7
XI–5	46	37	9	14
XI–6	5	2	3	10
XI–7	36	29	7	11

fixation in lines 2, 3, 4, and 11. In the second line the maximum span is comparatively small, then large and finally small again. In the fourth line the maximum span is wide for every fixation but the minimum span shows considerable variation. In line 11 there is an exceptionally wide maximum span for every fixation except the sixth. The reason for this variation is that fixation 6 makes a long regressive movement which cuts the span nearly to zero. The eye-voice span of this subject shows an elasticity both within the line and from line to line. The relation of the eye and voice is apparently adjusted according to the demands made upon the reader by the material. As noted in the preceding chapter, the beginning and end of a sentence demand a different type of eye-voice span. There are without doubt other factors which influence the width of the span, among which difficult words and difficult meaning would have a place. It has already been shown that the eye-voice span of the immature reader is narrow, while pupils with more mature reading habits have a wider span. An examination of Plates XXI, XXII, XXIV, and XXV shows very clearly that when the difficult words in lines 5 and 6 are encountered the subjects who are mature readers return at once to a type of reading which can be described as less advanced and keep their eye and voice very close together. The elastic nature of the eye-voice span is very evident when such difficult words are encountered. A more detailed anaylsis of the reaction to difficult words will be given in the latter part of this chapter.

RELATION OF EYE-VOICE SPAN TO LENGTH OF FIXATIONS

An examination of the records of the subjects used in this investigation will show that while the median duration of a fixation pause varies from 9 to 13 fiftieths of a second, there frequently occur fixations which are very much longer. A tabulation of the fixation pauses of nineteen high-school subjects shows an average for each subject of 14 fixations which are more than 20 fiftieths of a second in length. The length of these long fixations varies from 20 to 93 fiftieths of a second. This unusual behavior on the part of the eye calls for an explanation. It was thought that an analysis of the continuous relationship of the eye and voice might help to explain the long fixations by showing what the voice was doing during those comparatively long intervals. The cause of these long fixations may be due to a number of factors. One possible hypothesis is that a long fixation occurs when the eye reaches too great a distance ahead of the voice, and that the eye remains fixated until the voice catches up to a convenient position, when the eye moves forward again. In terms of this hypothesis a long fixation would mean a period during which the voice was trying to catch up with the eye.

In order to test this hypothesis a study was made of the ten longest and ten shortest fixations for each of ten subjects. The average maximum and minimum spans and the range were tabulated for each subject. If the hypothesis were true, the maximum span and the range should be greater for the long fixations than for the short ones. Such a condition would be evidence that, in case of the long fixations, the eye had been leading by too wide a span and that a long fixation was provided for the voice to catch up. The result of the comparison of the fixations of the ten subjects is given in Table XIV. The table should be read as follows: The record of Subject E1 shows, for the ten longest fixations, an average maximum span of 18.6 letter-spaces an average minimum span of 11.9 letter-spaces, and a range of 6.7 spaces; and for the ten shortest fixations, a maximum span of 15.3 letter-spaces, a minimum span of 13.4 spaces and a range of 1.9 spaces.

TABLE XIV

Relation of Eye-Voice Span to Length of Fixations

Subject	Ten Longest Fixations			Ten Shortest Fixations		
	Maximum Span	Minimum Span	Range	Maximum Span	Minimum Span	Range
E1	18.6	11.9	6.7	15.3	13.4	1.9
E5	14.9	8.1	6.8	16.7	13.5	3.2
E8	14.1	9.3	4.8	13.8	11.6	2.2
H1	27.7	16.0	11.7	29.6	24.3	5.3
H5	18.9	10.7	8.2	17.6	15.0	2.6
H8	31.4	21.6	9.8	25.9	22.0	3.9
H10	22.8	11.8	11.0	23.0	19.6	3.4
H22	22.5	13.9	8.6	15.0	12.2	2.8
H23	20.8	11.3	9.5	18.6	15.2	3.4
A3	20.4	11.5	8.9	20.0	17.0	3.0
Average	21.2	12.6	8.6	19.6	16.4	3.2

The averages for all of the ten subjects do not fully justify the hypothesis. The maximum span for the long fixations is greater than that for the short fixations, but only by a small amount. It is not a satisfactory explanation to say that an average span of 21.2 letter-spaces was so great as to cause a very long fixation, while a span of 19.6

letter-spaces was not found inconvenient and was accompanied by the shortest fixations. The difference is not great enough to justify the hypothesis, and the conclusion must be drawn that width of eye-voice span is at least not a large factor in the cause of long fixations.

The average range, for all subjects, for the long fixations is 8.6 letter-spaces, while for the short fixations it is only 3.2 letter-spaces. This cannot be regarded as an explanation of the cause of the long fixations, but it merely shows that the voice is moving over a greater range during the long pauses.

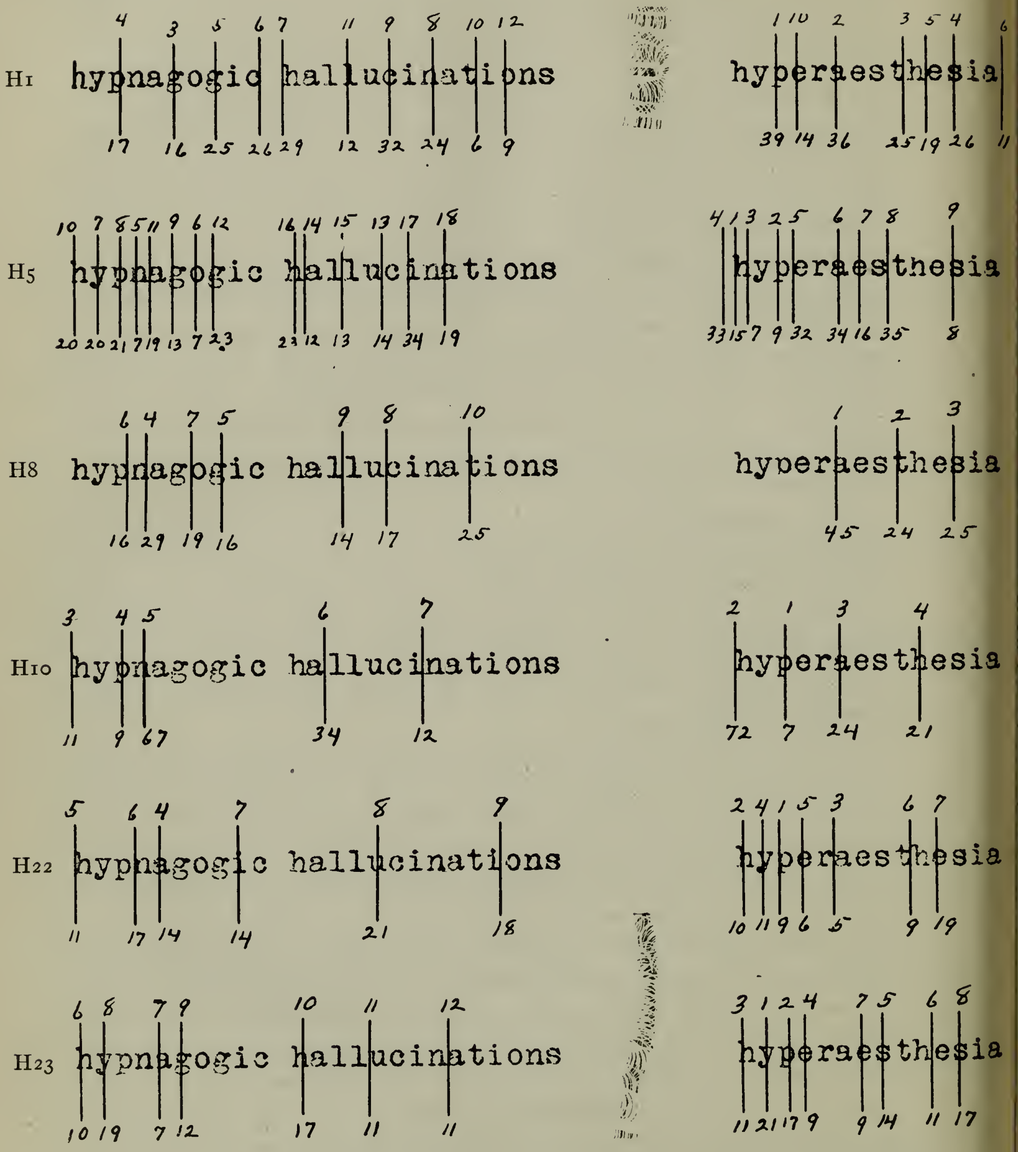
The data presented in Table XIV cannot be regarded as sufficient evidence to establish a causal relationship between a long eye-voice span and a long fixation pause. When the span becomes too long for convenience the eye seems to react by a series of short fixations covering small intervals as often as by a single long fixation. The eye is the controlling factor rather than the voice, and other factors of perception must operate to lengthen the eye pauses.

A cue to a possible cause of the long fixations may be found from another source than the eye-voice span. The eye-movements of all high-school subjects were radically modified when the three difficult words in lines 5 and 6 were reached. These words were new to all of the high-school subjects. Two characteristic differences are evident in the behavior of the eye toward these words. The number of fixations is greater and the percentage of long fixations is larger when the difficult words are encountered.

Plate XXX shows a comparison of the eye-movements of six high-school subjects in reading these three words. The column of numbers at the right of the plate gives the median length of all fixations. The first line of the plate gives the record of Subject H1. The median length of the fixations of this subject for the whole selection was 12 fiftieths of a second. In reading these words 13 of the 17 fixations are longer than the median. Of these 13 fixations, 9 are more than twice as long as the median for the selection. Subject H5, in the next line, makes 23 fixations on the three words, 18 of which are longer than the median. Subject H10, in the fourth line, makes only 9 fixations of which 6 are greater than the median. Two of these 6 are very long, however, being 67 and 72 fiftieths of a second.

The results shown by Plate XXX make it clear that difficult words are one cause of long fixations. They suggest that an explanation of the occurrence of long fixations may be found in the content of the reading selection. In order to test this possibility, a study was made of

PLATE XXX



Effect of new and difficult words upon eye-movements. Six high-school subjects all fixations which were longer than 20 fiftieths of a second in the records of nineteen subjects. The readings of these nineteen subjects showed a total of 259 fixations which were over 20 fiftieths of a second in length. The selection which these subjects read contained ninety words. If the long fixations simply occurred at random there should be an average of 2.9 for each word in the paragraph. The number and duration of these long fixations, for each word in the selection, are given in Plate XXXI. This plate shows that three of the pauses occurred on the first word, "the," and that their duration was 38, 22, and 30 fiftieths of a second. Only one long fixation occurred on the word "two," three fell on the word "men," two on "were," etc. The point of interest in the plate is that the long fixations are not distributed in a random fashion with 2.9 falling on each word, but that they occur much more frequently on certain words than on others. The greatest number of long fixations fall upon the words "hyperaesthesia," "hypnagogic," and "hallucinations," these words receiving 31, 22, and 16 fixations respectively. Since these are the most difficult words in the paragraph, there can be no doubt that difficulty is one factor causing long fixation pauses. It will be noticed that thirteen words each receive as many as six or more of these long fixations. These words are underlined in the plate.

If the same cause operates to produce long fixations on all of the words, there must be some point of difficulty connected with the words receiving a larger number of such pauses. The word "consciousness" in the last line and the word "grew" following it appear to present difficulties. This is doubtless due to the fact that "consciousness" is not a common word to high-school pupils, and when used with "grew" it presents an idea which is difficult and unfamiliar. The phrase "objects need not" in the third from the last line presents familiar words in an unfamiliar combination. The whole quoted sentence contains a difficult thought, and by the time this phrase is reached the difficulties come to a focus. The fact that "objects" has the same form both as a noun and as a verb may add to the confusion. No explanation is offered as to why "namely" in the eighth line should receive six long fixations. In line 6 the word "further" is not as common with high-school pupils as the form "farther" which might account for the difficulty. In line 4 the words "began" and "read" both present tense difficulties. The word "began" is often confused with "begun." The word "read" is spelled alike for both present and past tense but is pronounced differently and often causes trouble in reading. No explanation is offered for the word "subject."

PLATE XXXI

The	two	men	were	seated	at	a	table	upon	which
38	20	21	20	28		21	23		23
22		21	23	28		27	25		20
30		21					20		20

many	books	and	papers	were	scattered.	The
35	35			21	44	28
26					22	21
23						27
36						
22						

older	man	turned	to	a	page	in	a	large	book	and
31	24	21		31	22		20			21
30	21	22		30			23			27
24	24	25								
20	20									
32	23									

began	to	read.	The	subject	of	the	chapter	was
20	22	24	20	34	22	22	21	22
22	36	28	22	23	22		20	
28		20		32				
21		21		32				
20		25		38				
20		30		23				
				24				

something	about	hypnagogic	hallucinations	and
		20-26-67-59	21-24-34-23	30
		20-29-31-22	23-34-25-53	
		21-24-42-42	32-26-21-43	
		23-29-32-20	20-22-23-23	
		25-29-21-23		
		24-43		

hyperaesthesia.	A	few	pages	further	on	he
34-34-22-25-29-24	56	28	20	24	24	
33-27-23-34-26-25	22	22		22		
74-36-23-21-35-29		21		20		
40-32-26-22-21-43		30		20		
23-21-24-45-25-32		52		20		
37				22		

Location of long fixation pauses, 19 subjects

PLATE XXXI*a*

came	to	a	sentence	which	read,	“One	thing,
24			21	30 20 23 29	20	21 24	27 25

however,	is	obvious,	namely,	that	the	manner	in
20 24 21 26 30	31 23 26	24 31 21	22 29 26 23 24 22				

which	we	become	acquainted	with	complex
			20 20 22		20 20 27

objects	need	not	in	the	least	resemble	the
35-38 20-43 25-24 22-23	34-26 25-38 26-24 21	28 20 27 20 21 23 32	22	24	21 22	22 28 21	22 20

manner	in	which	the	original	elements	of	our
24		22		34 24 27	20 30 21		38 26 20

consciousness	grew	up.”
25-24-23 39-40-22 20-57-23 20-22	93 29 21 30 26 24	27

PLATE XXXI—*Continued*

The results of this form of tabulation indicate that difficulty of material must have some relation to the length of fixations. No other explanation is apparent which could account for the fact that only six long fixations fall on the ninth line while thirty-one fall on the tenth.

A similar form of study was applied to the elementary pupils. Their records showed that long fixations were distributed over all the words of the selection. Apparently even simple words present difficulties to a child in the elementary school.

The interpretation of the foregoing data must be related to the development of reading habits. The records of the elementary subjects, whose reading habits are still immature, show that long fixations are frequent and occur all through the selection. Evidently long fixations are characteristic of immature types of reading. The high-school and adult subjects represent more mature readers. In general they have outgrown the long fixation habits. However, when words of special difficulty or difficult phrases are encountered, they return immediately to the primitive type of habits characteristic of the immature reader. Earlier in this chapter the same kind of a reversion to primitive reading habits was observed in the narrowing of the eye-voice span when difficult words were encountered.

The conclusion to be drawn regarding the long fixations is that width of eye-voice span is not a determining factor. The return to immature reading habits caused by encountering difficulties in the reading material is apparently a more adequate explanation.

CHAPTER IV

THE EYE-VOICE SPAN AND THE RECOGNITION OF MEANING

MATERIAL AND METHOD USED

The use of a photographic method gives the most accurate measure of the eye-voice span. The general use of this method is limited, however, by the very elaborate apparatus which is involved. It would be desirable to have a device which would give objective information regarding the eye-voice span without use of apparatus. Quantz, in his study cited in the introductory chapter, called attention to a fact which is of special significance. He suggested that certain words which are spelled alike but pronounced differently might be used to determine eye, voice, and meaning relationships. This chapter reports the testing of such a device by photographing the eye-movements which occur when such words are encountered in the reading.

A paragraph of twelve lines was constructed, which contained six words which are spelled alike but pronounced differently. The subjects were not informed that the paragraph was unusual in any respect, but were instructed to read it carefully in order to get the meaning. The subjects read orally and were not allowed to glance over the selection before beginning to read. The test passage used was as follows:

> The boys' arrows were nearly gone so they sat
> down on the grass and stopped hunting. Over
> at the edge of the woods they saw Henry
> making a bow to a little girl who was coming
> down the road. She had tears in her dress
> and also tears in her eyes. She gave Henry a
> note which he brought over to the group of
> young hunters. Read to the boys it caused
> great excitement. After a minute but rapid
> examination of their weapons they ran down
> the valley. Does were standing at the edge
> of the lake making an excellent target.

The test words in the paragraph are "bow" in line 4, "tears" in line 5, "tears" in line 6, "read" in line 8, "minute" in line 9, and "does" in line 11. The paragraph is so constructed that the meaning of these words is not evident until the next few words in the sentence are read. For example, in line 5, the word "tears" is ambiguous until the word "dress" is reached. The hypothesis in regard to the eye-voice span is that no error will be made in the reading if the span is wide enough to enable the reader to take in the word "dress" before pronouncing the word "tears." If the span is not wide enough to do this, there is a strong probability of error. By varying the distance between the test words and the part of the sentence which qualifies it, a rough measure of the width of the eye-voice span can be secured. If this hypothesis is correct, subjects having a wide eye-voice span should make fewer errors than those whose span is narrower.

The use of such a paragraph will also help to answer the question as to where the recognition of meaning occurs in the reading process. Does the recognition of meaning accompany the eye or the voice, or is it intermediate? A similar question could be raised in regard to silent reading.

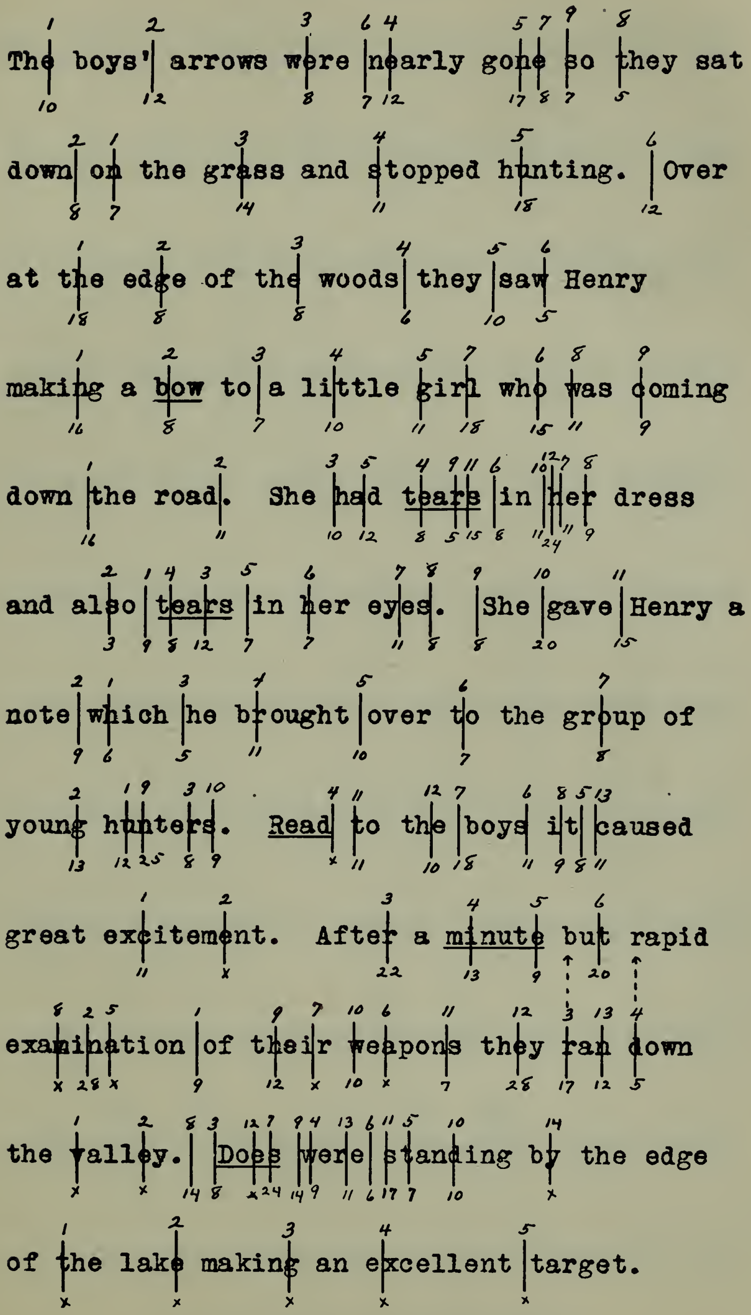
ORAL READING OF TEST PASSAGE

Photographs were made of the eye-movements of a number of subjects while reading this selection. A comparison of the behavior of the eye, when encountering one of the test words, with the dictaphone voice record will show how closely the two are related. Plates XXXII–XXXIV give the records of the oral reading of this selection by three subjects.

Plate XXXII gives the record of Subject H13, a good reader from the junior class. In the reading of the first line of the selection, a long regressive movement occurred at the sixth fixation, carrying the eye back over the word "nearly." The dictaphone record showed that he had trouble with this word, hesitating before pronouncing it and repeating the first syllable as follows, "nea – – nearly." The fact that the fifth fixation, the one just before the regressive movement, fell on the word "gone" would indicate that the eye had passed the word "nearly" but was recalled when the voice reached it. Evidently the eye did not fully recognize the meaning of the word when it fixated on it the first time, and the regressive movement occurred to make sure of the meaning.

The next difficulty which is evident in the record of this subject is found in the fifth line on the word "tears." This was one of the test

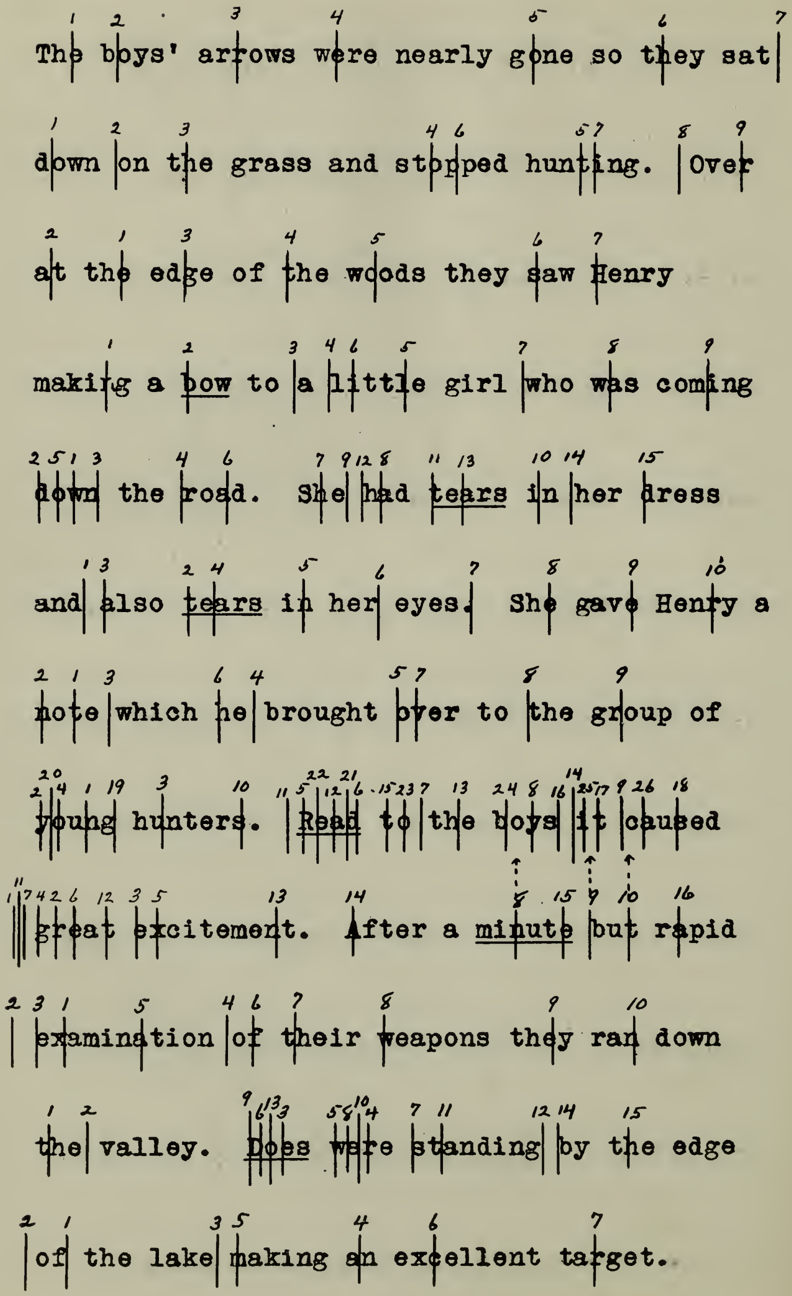
PLATE XXXII



The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target.

Oral reading of test passage by Subject H13

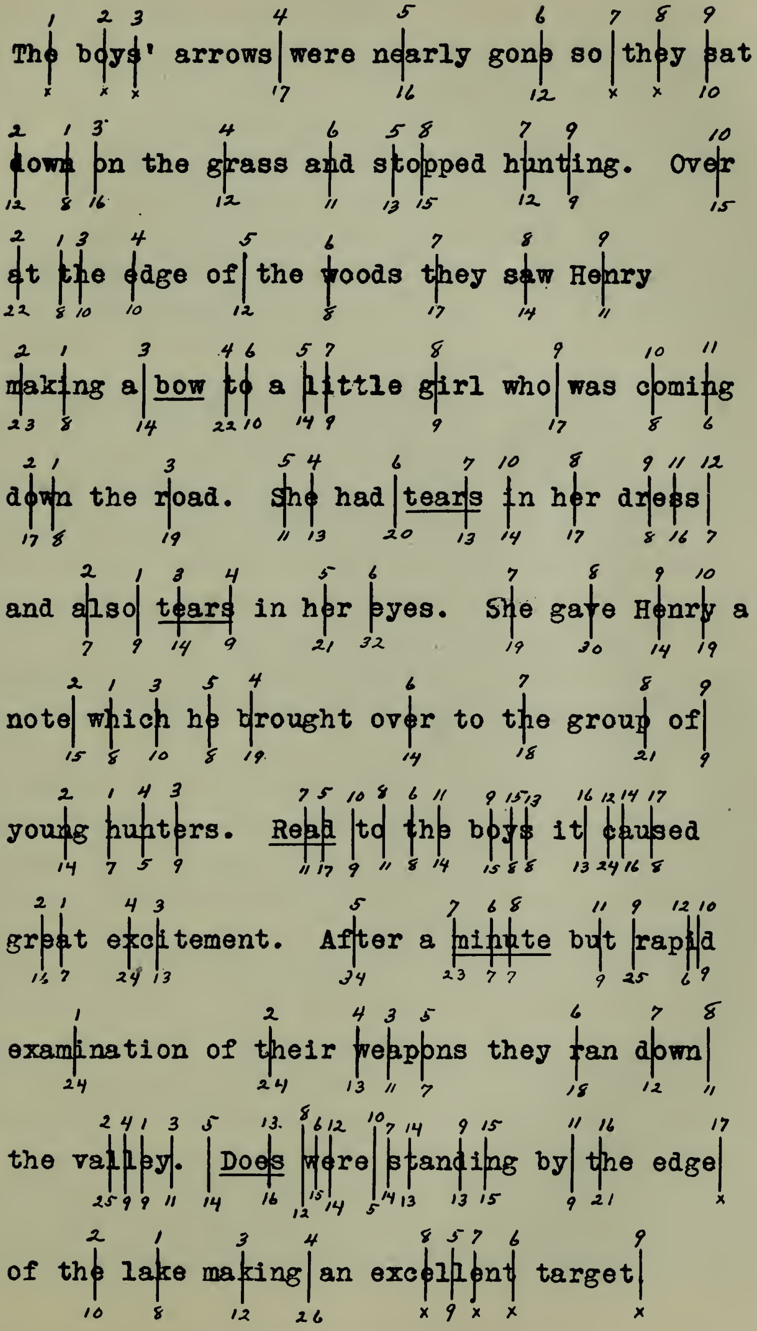
PLATE XXXIII



The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target.

Oral reading of test passage by Subject A1

PLATE XXXIV


The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target

Oral reading of test passage by Subject A3 words and it caused the reader a great deal of trouble. The eye passed and returned to the word twice before the correct meaning was recognized. The dictaphone record read as follows: "She had – ah – tear (error) – – tears (correct) in her dress." The difficulty experienced is clearly reflected in the eye-movements. In line 6 the reader approached "tears" very cautiously and was successful in avoiding an error.

In the eighth line the word "read" caused a period of confusion for the eye. Following the eye-fixations in serial order, it will be seen that the difficulty did not appear until after the fifth fixation just following the word "it." The dictaphone shows that the voice proceeded to the word "it" before being fully aware of its error. The record was as follows: "Read (error) to – – read (error) to the boys – – – read (correct) to the boys it – –."

In the ninth line the word "minute" was mispronounced and left uncorrected. The voice repeated the phrase "but rapid" twice. The accompanying eye-movement may be seen in the third and fourth fixations of the next line. These fixations, as indicated by the dotted line, were regressive movements to the last two words of the ninth line.

In the eleventh line the voice made a very long hesitation before pronouncing "does," but succeeded in pronouncing it without error. The film record shows that the eye passed back and forth over the word several times before the meaning became clear. The subject had evidently become cautious and did not attempt to pronounce the word until the meaning was recognized.

Plate XXXIII gives the record of Subject A1, a college student ranked as a poor reader. A correlation between eye and voice difficulties appears here as in the case of Subject H13. The word "bow" in line 4 was mispronounced but was immediately corrected. The regressive movement from the fifth to the sixth fixation shows the location of the eye at the time of the readjustment.

The word "tears" in line 5 was mispronounced and passed without correction. The voice also repeated the word "had" just preceding "tears."

The voice had a very difficult time with the word "read" in the eighth line, repeating the phrase three times before reading it correctly. The reading was as follows: "– – – read (error) to – – – – – read (error) to the boys it caused – – – read (correct) to the boys – – – – – – –." The difficulty in eye-movements was fully as great, the eye making 26 fixations on the line. The confusion in eye-movements in the next line shows that the eye had made at least 10 fixations there before the reading was corrected. Fixations 8, 9, and 10 in line 9 were regressive movements back to the end of line 8.

The reaction to the word "does" in line 11 was a very long hesitation on the part of the voice, the word finally being pronounced without error. The fixations show that the eye was very busy during the pause and that it made a minute survey of both "does" and "were."

Plate XXXIV, showing the record of Subject A3, brings out the same kind of correlation between voice and eye difficulty. This subject made errors in pronouncing "bow" in line 4, "tears" in line 5, "read" in line 8, "minute" in line 9 and "does" in line 11. More or less confusion in eye-movements can be observed in all of these positions on the plate.

The records of these subjects make it very evident that certain characteristic confusions in eye-fixations accompany points of difficulty in oral reading. A comparison of the percentage of errors made in the reading of this selection with the eye-voice span as determined by the other part of this study would show whether any relation exists between width of eye-voice span and these same oral-reading difficulties.

TABLE XV

Errors in Word Test Paragraph—Oral Reading

Subject	Number Test Words in Passage	Number Correct	Number Errors Corrected	Number Errors Not Corrected	Average Eye-Voice Span
H4	5	3	0	2	10.0
H5	6	2	3	1	12.0
H6	6	1	4	1	12.4
H11	5	0	1	4	9.6
H12	5	3	1	1	13.7
H13	6	2	3	1	13.8
H14	6	4	0	2	17.6
H15	6	3	1	2	12.3
H16	6	4	0	2	8.5
H18	6	2	2	2	11.5
H19	6	4	1	1	12.8
H20	6	4	2	0	23.0
A1	6	2	2	2	12.2
A2	6	1	1	4	9.3
A3	6	1	2	3	13.6

Table XV gives the data for the reading of a selection containing this kind of test words by 15 subjects. The table shows the number of test words in the passage, the numbers pronounced correctly the first time, the number of errors which were corrected, the number of errors not corrected, and the average eye-voice span. Table XVI is made up from Table XV, and shows the relation of errors in the test paragraph

TABLE XVI

RELATION OF ERRORS IN WORD TEST PARAGRAPH TO EYE-VOICE SPAN

Number of Subjects	Test Score—Per cent of Words Correct and Corrected	Average Eye-Voice Span
1	1–20	9.6
1	21–40	9.3
2	41–60	11.3
6	61–80	12.6
5	81–100	14.8

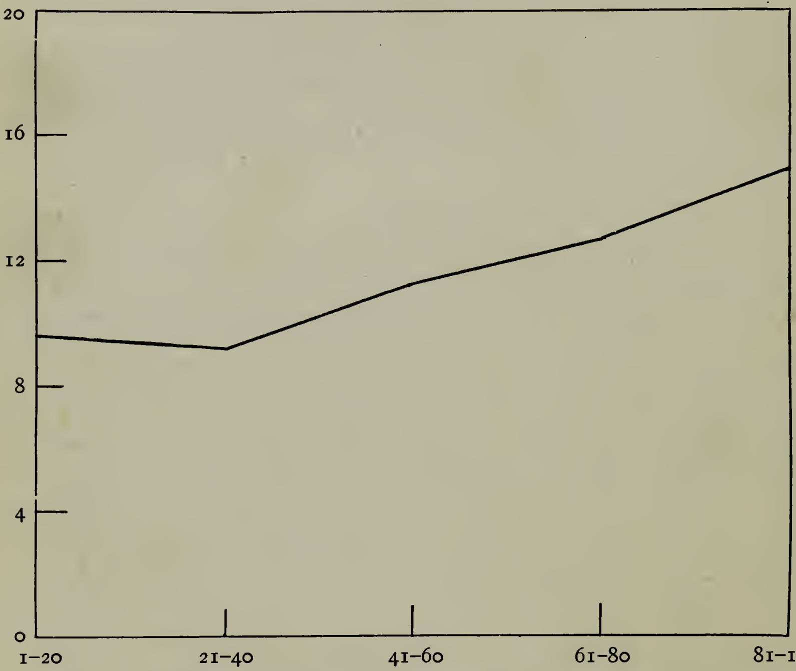


FIG. 12.—Relation of errors in word test paragraph to eye-voice span. Percentage of words correct shown on horizontal axis. Average eye-voice span on the vertical axis.

to the eye-voice span. This table is based upon the percentage of test words in the paragraph which were pronounced correctly at first or were immediately corrected. It should be read as follows: One subject pronounced from 1 to 20 per cent of the words correctly and had an average span of 9.6 letter-spaces, one pronounced from 21 to 40 per cent correctly and had an average span of 9.3 letter-spaces, two pronounced from 41 to 60 per cent correctly and had an average span of 11.3 spaces, etc. The same data are shown graphically in Figure 12. A distinct positive correlation is evident between a wide eye-voice span and a high score in reading the selection. A subject with a wide span has an opportunity to interpret the meaning in larger units and is able to get the correct meaning before the voice reaches the points of difficulty.

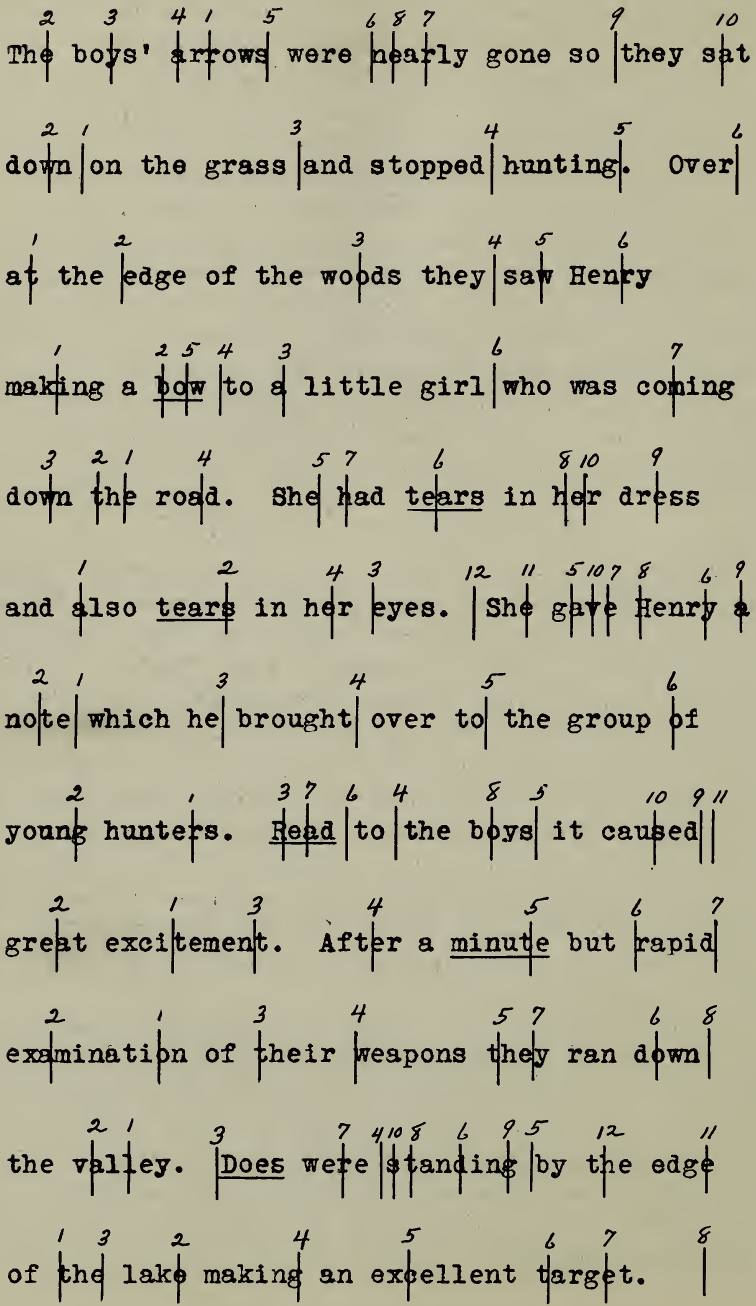
Two facts stand out clearly as a result of the use of the paragraph containing the test words. The first is that difficulties in the recognition of meaning are reflected in the character of the eye-movements. The second is that subjects with a wide eye-voice span have less difficulty with such material than do subjects with a narrower span. Whether the eye-voice span is a cause or an effect will need to be determined by a careful analysis of the development of reading. This question will be considered in the last section of this chapter.

SILENT READING OF TEST PASSAGE

The facts brought out in the oral reading of the test passage suggested that a comparison with silent reading might be of interest. With this purpose in mind, photographs were taken of the silent reading of the same passage by a number of subjects. Plates XXXV to XXXVII show the records of these readings. Plate XXXVI gives the silent-reading record of Subject H7, a good reader from the sophomore class. This subject made a great many fixations per line all through the selection, which was due to the direction to "read it carefully in order to get the meaning." The larger number in the first line shows the reaction of the eye to new material. Eye-movements for the first line of any selection are seldom characteristic of the movements for the selection as a whole. The reading of the next three lines shows that the eye had settled down to a rhythmic movement. Apparently the word "bow" in line 4 caused no difficulty.

In line 5 the word "tears" caused a break in this rhythmic movement but the correct meaning was evidently obtained without great difficulty. In the next line the word "tears" caused considerable disturbance, and several regressive movements were necessary. The word "read" in line 8 caused little trouble. In line 9 the word "minute" apparently created a great deal of difficulty. The eye behaved in the same manner in this as it did in the oral selections at a point where the voice had difficulty.

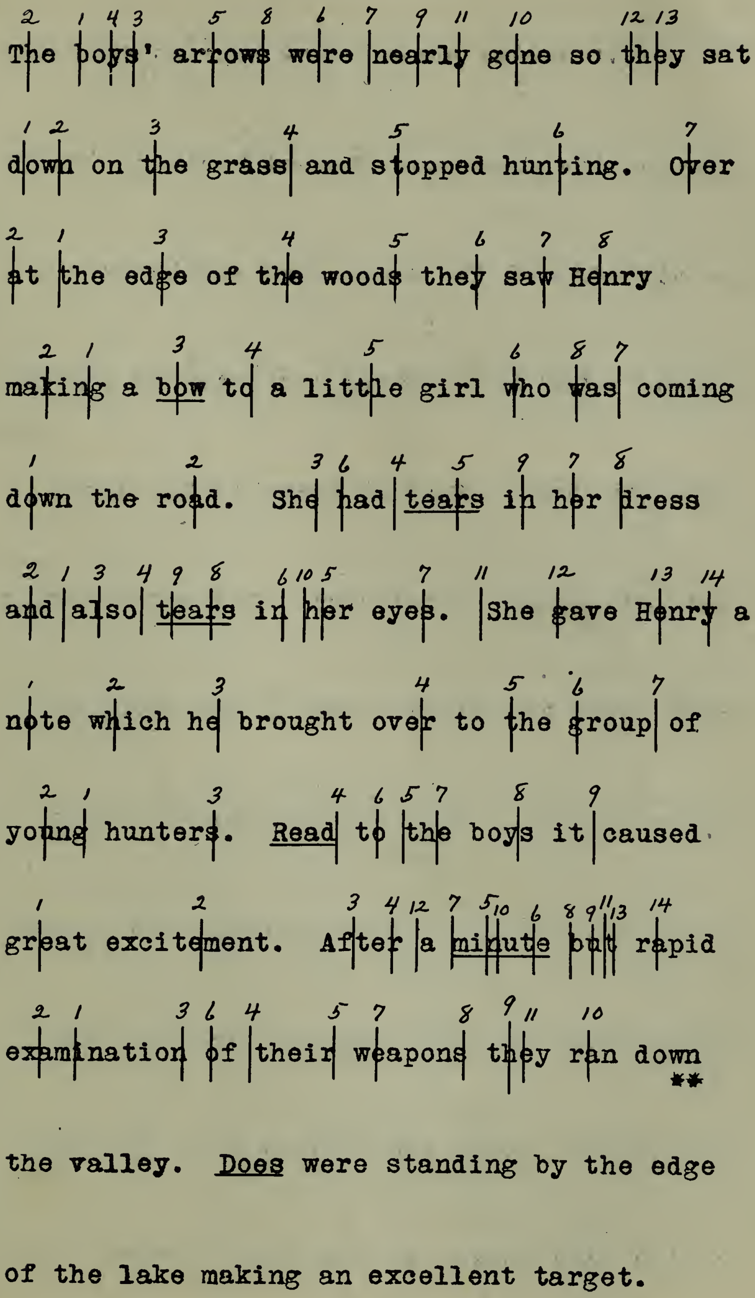
PLATE XXXV



The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target.

Silent reading of test passage by Subject H3

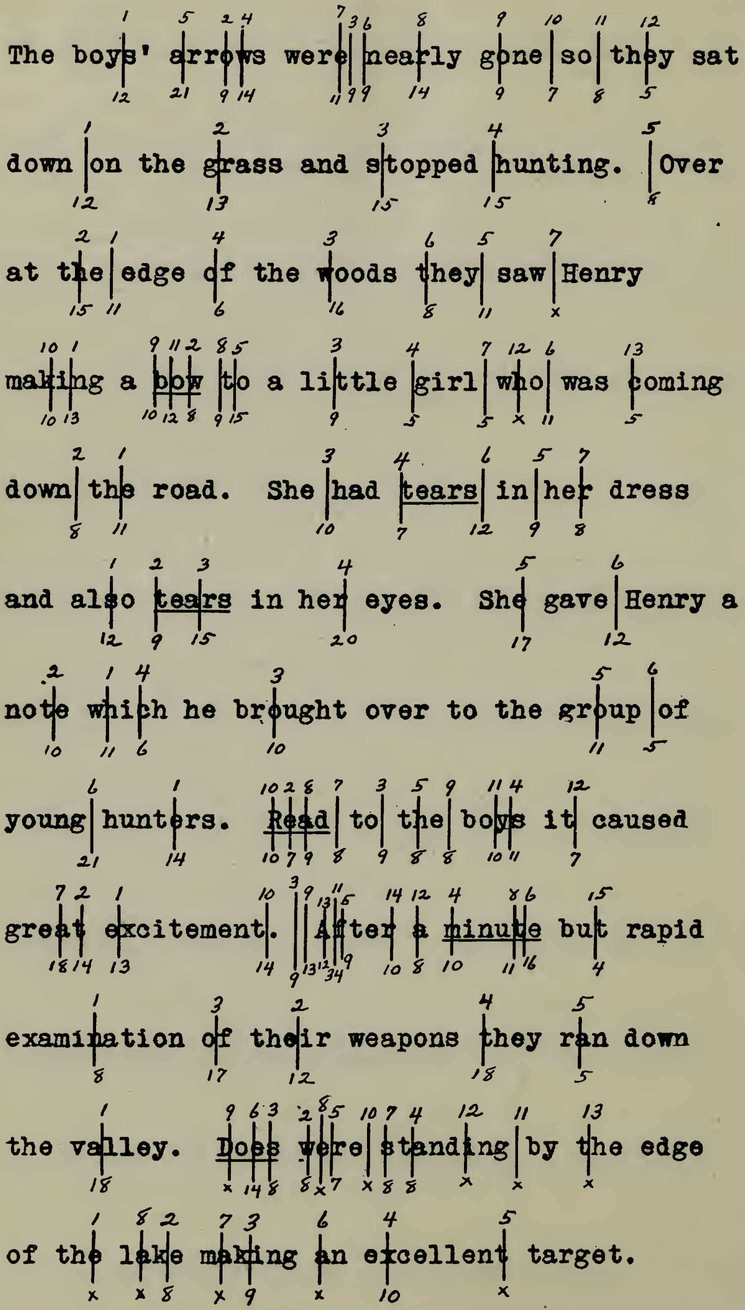
PLATE XXXVI


2 1 4 3 5 8 6 7 9 11 10 12 13
1 2 3 4 5 6 7
2 1 3 4 5 6 7 8
2 1 3 4 5 6 8 7
1 2 3 6 4 5 9 7 8
2 1 3 4 9 8 6 10 5 7 11 12 13 14
1 2 3 4 5 6 7
2 1 3 4 6 5 7 8 9
1 2 3 4 12 7 5 10 6 8 9 11 13 14
2 1 3 6 4 5 7 8 9 11 10
**

The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target.

Silent reading of test passage by Subject H7. (**—end of film)

PLATE XXXVII



The boys' arrows were nearly gone so they sat
down on the grass and stopped hunting. Over
at the edge of the woods they saw Henry
making a bow to a little girl who was coming
down the road. She had tears in her dress
and also tears in her eyes. She gave Henry a
note which he brought over to the group of
young hunters. Read to the boys it caused
great excitement. After a minute but rapid
examination of their weapons they ran down
the valley. Does were standing by the edge
of the lake making an excellent target.

Silent reading of test passage by Subject A4

The record of Subject A4, a good reader from the college, is given in Plate XXXVII. This subject also shows a characteristic reaction to the first line of the selection, not falling into a rhythmic movement until the beginning of the second line.

The record of line 4 shows clearly that the word "bow" presents a difficulty. Evidently the wrong meaning was used at first and the eye returned to it several times before getting the correct interpretation. The word "tears" did not cause any marked disturbance in the reading. "Read" in line 8 and "minute" in line 9 each caused a radical change in eye-movement. The same kind of confusion occurs with these two words which, in the oral readings, accompanied a serious error in the reading. In line 11 the word "does" causes fully as much trouble as in any of the oral selections. This shows that the eye-movements in both oral and silent reading are largely controlled by the recognition of meaning.

THE RELATIONSHIP BETWEEN ORAL AND SILENT READING

The preceding sections have shown that the difficulties in both oral and silent reading are indicated by similar disturbances in eye-movements. The eye-movements are evidently more directly related to recognition of meanings than are the eye-voice spans. The reasons for this can be brought out more clearly if we review the development of reading from its early oral stages to the later and more mature stages of silent reading.

In a primitive or very immature type of reading the eye and voice proceed exactly together. The recognition of meaning also accompanies them. Progress at this stage is made a word at a time, or, if the word is too complex, progress is by shorter units, even letters. The attention span is so small that the eye does not move on until the voice has pronounced the word or syllable. In the case of words which are new to sight, but whose meaning is known when heard, the meaning is arrived at only by the sounding and pronouncing of the word. The oral pronunciation is a definite step in the recognition of meaning. A concrete example of such an eye-voice-meaning relationship is found in Plate VI, line 1. Here the reader is keeping his eye fixated upon the word while he is pronouncing it and getting its meaning. This pupil, who is a poor reader from the second grade, has a primitive, immature type of reading habit. Line 1 of Figure 13 represents graphically such a situation. The eye, *E*, the voice, *V*, and the meaning, *M*, keep very close together.

Plate VIII shows the record of Subject E7, a poor reader from the third grade, who keeps his eye an average of 8 letter-spaces ahead of his voice. This reader exhibits a little more complex type of reading habit. The attention span has developed until the meaning can be followed even though the eye is some distance ahead of the voice. In Figure 13 this pupil is represented by line 2. The eye is shown to be 8 letter-spaces ahead of the voice. Since this reader is still very immature and has a narrow eye-voice span it seems probable that he still relies on his oral pronunciation to get the meaning of his words, and for this reason the meaning, *M*, is located a little nearer the voice than the eye. As the student learns to read to himself the meaning attaches itself more closely to the position of the eye. Accordingly, in the other lines of Figure 13, *M* is located nearer the eye than the voice. The whole matter of the location of *M* in the figure is merely schematic since there is no objective evidence upon which an exact location can be based.

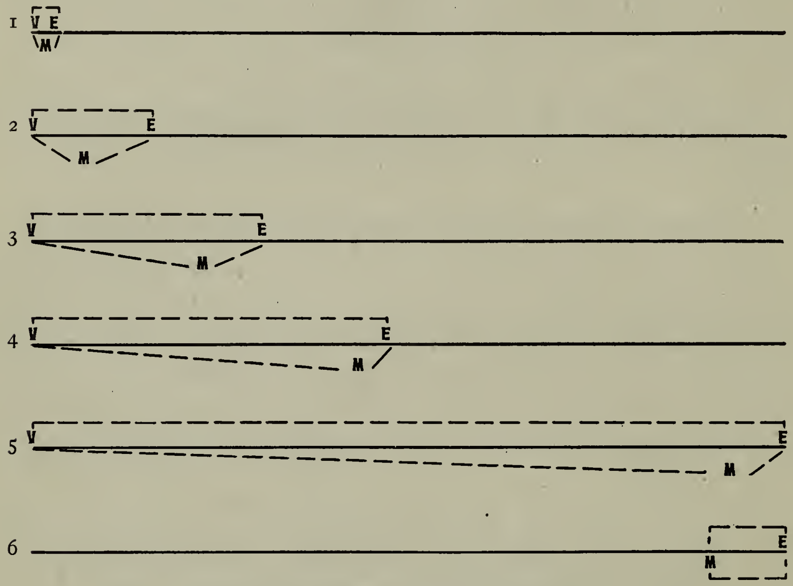


FIG. 13.—The development of the attention span in reading

The attempt to locate the position of *M* presents a very complex problem. Meaning itself is not a unitary and complete sort of thing which occurs instantaneously at certain points through the reading. After a reader has mastered his vocabulary, the recognition of the meanings of words, except in the case of new or difficult ones, doubtless occurs as soon as the eye perceives the words. The recognition of the meaning of words therefore might be said to keep pace with the eye. But the complete meaning of a sentence or a paragraph is not made up by summing together the individual meanings of the words. The meaning of each word in a sentence is modified by what precedes and follows. Phrases, clauses, or whole sentences are the units and the recognition of the complete meaning must be in a liquid state during the reading process, being subject to continual change and being held in the mind in a tentative fashion until the end of the unit of thought is reached. To speak of a location for the recognition of such a developing meaning as this would probably refer to the focal point in the moving conscious state or attention span by which the mind "carries on" in the reading process. That this focal point or the apex of the moving attention span would be nearer the eye than the voice is also indicated by the amount of conscious attention given to these two factors. The motor reaction of the voice ultimately becomes quite automatic. It follows along behind the eye at a distance such that the immediate memory association with the material perceived is kept intact but it is back in the margin of consciousness as long as no special difficulty is encountered. The principal part of the attention span is concerned with the new material which the eye is receiving, and with translating this into the meaning whole. Consequently the focus of attention is centered around the eye and the meaning, while the voice is largely left to pronounce the words automatically with a minimum amount of consciousness accompanying it.

The successive lines in Figure 13 represent increasing degrees of maturity of reading. Line 3 shows the record from Plate XXII of Subject H5, whose average eye-voice span is 12 letter-spaces. Line 4 shows the record from Plate XIV of Subject E22, whose average eye-voice span is 19.7 letter-spaces. Line 5 shows the eye-voice span of Subject H1 at a fixation in the next to the last line in Plate XXI*a*. At this point the reader's eye was 46 letter-spaces ahead of her voice, which indicates a high degree of maturity of reading habits.

The previous chapters of this study have pointed out that there is a close relationship between a good quality of reading and a wide eye-voice span. The question was raised as to which of the two is cause or effect. It would appear that both are effects, and that the causal element is the existence of a general attention span wide enough to hold a large number of words or reading elements in the mind at one time.

The preceding evidence shows that a poor, immature reader can hold only a few letters or words in the focus of attention, while more mature readers are the ones who have a wide attention span. Progress in reading would therefore be a matter of the development of the span of attention to such a degree that it would be possible for the eye to keep a considerable distance ahead of the voice and thus provide a wide margin for the interpretation of meaning. The extent to which such a span may be developed, or to which it is dependent on factors of native capacity, will need to be determined by further experimentation. The problem would seem to be worth a careful investigation through an elaborate training experiment.

It is an interesting fact to note that Subject H1, who at one point had a maximum span of 46 letter-spaces, reduced her span to 5 letter-spaces when the word "hallucination" was encountered. The same tendency to cut down the width of the span is evident whenever any difficulty is encountered. At such times the reader is placed in the same situation as a child, and returns at once to the same primitive type of eye-voice relationship which is characteristic of the habits of the immature reader.

The relation of oral to silent reading can now be shown more clearly. In such a case as that represented in Figure 13, line 1, the attention span for oral or silent reading would be the same, since the eye, voice, and recognition of meaning move along as a unit. As more mature reading habits are formed the nature of the attention span becomes different for the two processes. For oral reading it includes the eye and meaning and also in a lesser degree the voice which, because of the automatic character of its reaction, allows its conscious control to be much reduced in intensity. The silent-reading process is entirely relieved of any attention to the voice and the whole of consciousness can be focused upon the eye and the meaning. Such a situation is represented in Figure 13 by line 6. It cannot be assumed, however, that in silent reading the width of the attention span is limited to the space from the eye to the meaning. The general range of attention must cover the reading material by complete thought units, and in the silent-reading process the width of the attention span must be great enough to do this. When the reader cannot maintain a span sufficiently wide for this, he falls back into more primitive habits and pronounces the words to make the meaning clear.

It has been pointed out that when difficulties are encountered in oral reading the eye-voice span is immediately reduced to a primitive form. The same thing occurs in silent reading. When the difficult words in the test paragraph were encountered in silent reading, the eye returned to the word causing the difficulty, just as it returned to the position of the voice in oral reading. An example of such a case is shown in Plate XXXIII at the word "read" in line 8. Here the reader experienced a difficulty in interpretation of the meaning at that point, and the eye which has passed the word "boys," returned to the word "read," cutting down the span from the eye to the recognition of meaning to zero in the same manner as in oral reading. If the difficulty in getting the meaning in silent reading is sufficiently great, there is a reversion not only to the habit of bringing the eye back to the location of the recognition of meaning, but also to the most primitive habit of silently pronouncing the words. This reinstates the most primitive form of reading where the eye, the voice, and the meaning proceed together.

The development of the reading process may therefore be traced through three stages. First, the most primitive or immature stage of oral reading where the eye, the voice, and the meaning are all focused at the same point. Secondly, the more mature stage of oral reading where there is a considerable span between the eye and the voice, with the recognition of meaning occurring at a point nearer to the position of the eye. Thirdly, the stage of silent reading where the reader is entirely relieved of any attention to the voice and where the entire attention can be given to the eye and the meaning, making possible the development of a much higher degree of proficiency.

In chapter ii it was observed that some good readers in the fifth grade had an average eye-voice span greater than many high-school pupils. The fact that some pupils had developed such a wide span during the first four years of school would indicate a possibility that, with sufficient emphasis and appropriate method, a wider span could be developed with other pupils. The time for the teaching of oral reading is during the first four school years. By the time the fifth grade is reached the mechanics of reading should be mastered by the pupils and a larger amount of silent reading given. Figure 3 makes it clear that a great many pupils have not succeeded in developing a wide eye-voice span even at the high-school level. If the assumption is true, as the evidence indicates, that a wide eye-voice span is closely related to a wide attention span, and that a wide attention span is essential to good silent reading, it is highly important that a wider eye-voice span should be developed if possible during the first four years of school. It should be developed during these years, first, because that is the period during which oral reading predominates, and secondly, because the advantage of a wide attention span should be made available for silent reading by the beginning of the fifth grade.

The fact that the subjects from the freshman class of the high school showed a wider eye-voice span than the subjects from the sophomore and junior years was ascribed to the special training given to this class by the English department. Evidently there were some elements of method in the special training which affected the eye-voice span. These specific methods should be available for use in the first four school grades. The results of this investigation indicate that the development of the eye-voice span is a factor of sufficient significance, for both oral and silent reading, to warrant further research through a training experiment making use of specific methods having this end in view.

INDEX

Analysis of regressive movements, 59
Apparatus, 3, 64
Attention span, 100
Automatic arc lamp, 3
Automatic voice reaction, 101

Beginning of sentence, eye-voice span at, 45

Cause of long fixations, 86
Cause of regressive movements, 58
Confusion periods, 93
Continuous eye-voice relationship, 64
Correlations with eye-voice span, 62
Courtis, S. A., 9

Development of eye-voice span, 33
Development of reading habits, 99, 103
Dictaphone, 6, 7, 64
Dictaphone records, 88
Difficult words, effect of, 69, 81

Elastic nature of eye-voice span, 69, 78
End of sentence, eye-voice span at, 43, 50
Errors in test paragraph, 93
Eye-line, 65
Eye-movements-just-preceding-regressive-movements, 60

Fixations, number of, 53, 56

Gray, C. T., 3, 4, 41
Gray, W. S., 7

Head line, 4
Head movement, 4

Immature reading habits, 86
Interpretation of meaning, 45

James, Wm., 10
Judd, C. H., 14

Length of fixations, 79
Letter-space, 9
Location of fixations, 4
Long fixations, 79, 83; cause of, 86

Mature reading habits, 62, 63
Maximum span, 68, 78
Methods of developing eye-voice span, 63, 104
Minimum span, 68, 78

Oral reading of test paragraph, 88

Photographic method, 3, 4, 87
Position in line, 3, 42, 50
Position in sentence, 14, 42, 48
Primitive type of reading habits, 102

Quality of reading, 17
Quantz, J. O., 2, 3, 41, 42, 50, 87

Range of span, 80
Rapid readers, 51
Rate of reading, 51
Reading selections used, 9, 87
Recognition of meaning, 88
Regressive movements, 32, 57
Relationship between oral and silent reading, 99, 103
Relationship between recognition of meaning and eye movements, 93, 99

Sampling method, 69
Short fixations, 80
Silent reading of test paragraph, 95
Stages of reading development, 103
Subjects, 7
Summary, analysis of eye-voice span, 62

Test paragraph, 87
Thought units, 50
Training experiment, 53, 104
Types of regressive movements, 58, 59

Unit of measure, 9
Upward eye movements, 24, 68

Voice line, 65

M. Wilford Poulson,

THE
UNIVERSITY OF CHICAGO

Founded by JOHN D. ROCKEFELLER

The Delayed Reaction in Animals and Children

A DISSERTATION

Submitted to the Faculty of the Graduate School of Arts and Literature, in Candidacy for the Degree of Doctor of Philosophy

DEPARTMENT OF PSYCHOLOGY

By

WALTER S. HUNTER

Published
at Cambridge, Boston, Mass.
HENRY HOLT & COMPANY
34 West 33d Street, New York
G. E. STECHERT & CO., London, Paris and Leipzig, Foreign Agents

ACKNOWLEDGMENTS

It is a pleasure to acknowledge my deep obligation to Prof. Harvey A. Carr both for setting the problem and for the careful supervision and criticism of the work here presented. To Prof. James R. Angell also I owe much. Not only has he subjected the monograph to a searching analysis; but, through that impalpable something called "laboratory atmosphere," he has influenced the tone of the interpretations. Prof. John B. Watson of Johns Hopkins University has read a first draft of the theoretical section of this paper. I wish to add a word of thanks to Mr. W. R. Hough and Dr. H. B. Reed for the guidance given me by the data which they had accumulated in an early study of the present problem. Further notice of their work is given below. Mr. De Vry, director of the Zoölogical Garden in Lincoln Park, Chicago, and Dr. Hornaday, director of the New York Zoölogical Garden, have both given me information concerning the habits of raccoons.

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. CRITICAL REVIEW OF HISTORICAL DATA 2
  1. Imitation 3
  2. Use of tools 5
  3. Dreams 8
  4. Learning curve 8
  5. Memory 9
  6. Thorndike's test 10
  7. Learning by being "put through" 14
  8. Recognition 16
  9. Rate of forgetting 16
  10. Association by similarity 16
  11. Reluctance and expectancy 17
  12. Varying means to the same end 17
  13. Reactions to a temporal series of colors 19
  14. Washburn's cat on the stairway 20

III. NOTES ON THE ANIMALS AND CHILDREN TESTED 21

IV. APPARATUS AND GENERAL METHOD 22

V. EXPERIMENTAL RESULTS 30
  1. Tests with animals 30
    A. Learning the association 30
      (a) Rats 30
      (b) Dogs 32
      (c) Raccoons 33
      (d) Summary 34
    B. Maximal intervals of delay attained 35
      (a) Group differences in maximal delay 35
      (b) Effect of size of release upon delay 37
      (c) Effect of backgrounds of different brightnesses upon delay 38
      (d) Effect of number of boxes upon delay 39
      (e) Effect of other conditions upon delay 39
    C. Methods of reaction after delay used by animals 39
      (a) Orientation of whole or part of body 40
      (b) Position in the box 47
  2. Tests with children 52
    A. Method of experimentation 52
    B. Are the results obtained from animals and children comparable? 53
    C. Learning 55
    D. Differences between the learning of animals and children 55
    E. Delayed reactions 57

VI. THEORETICAL CONSIDERATIONS 62
  1. The cues essential for correct delayed reactions 62
    A. Substitutes derived from the external environment 63
    B. Substitutes derived from within the subject's body 67
      (a) The type of internal cue used 67
      (b) The mechanism by which internal cues guide behavior 70
  2. The place of ideas in the grades of animal learning 73

VII. SUMMARY AND CONCLUSIONS 79

VIII. APPENDIX 82
    A. Detailed records of two rats and two raccoons 82
    B. Notes on raccoons 85

I. INTRODUCTION

The experiments in this monograph[1] aim at an analysis of typical mammalian behavior under conditions where the determining stimulus is absent at the moment of response. Associations were first set up between movements that led to food and a light which might be in any one of three boxes. Controls were used to make sure that the position of the light alone determined the reactions of the subject. Tests were then instituted in which the light was turned off before the reaction was made. The subject thus had to respond in the absence of the stimulus that hitherto had guided his reactions.

The nature of the present experiment may be further set forth by contrasting it with the following type of adjustment: A cat watches for a mouse and sees it appear at an open hole. The mouse vanishes before the cat can react, yet the cat goes over to the hole. There can be no question here but that the determining stimulus is absent at the moment of response, provided possible olfactory stimuli be neglected. Our experiment differs from this in complexity. If there were three holes that differed only in their several directions from the cat, and if in the past the mouse had appeared an equal number of times in all three holes, the conditions would be the same as in our tests. A selection between the three holes would need to be made on the basis of the immediately previous presence of the rat, if a correct reaction were to occur. If an animal *can* manifest behavior that does not lend itself to a "stimulus and response" explanation, this is one type of situation in which that behavior should appear. That, in fact, it is the situation *par excellence* for the eliciting of this behavior will, I believe, appear as this monograph progresses.

---

[1] Experimentation on the present problem was first begun in the University of Chicago laboratory by a graduate student, W. R. Hough. The following year the work was taken up and carried somewhat further by another student, H. B. Reed. Both students worked with white rats. Although in each case the results obtained were in strict harmony with those presented in this paper, in neither case were they conclusive. The chief value of the work lay in its suggestiveness. The apparatus used by Reed—Prob. Box D—is described below. The present investigation was carried on in the same laboratory from October, 1910 to April, 1912.

In the present experiments, two main factual questions arise: (1) How long after the determining stimulus has disappeared can an animal wait and still react correctly? (2) Does the animal give any behavior cues as to its method of solving the problem? If so, what are they? With these data given, there remains the task of interpretation. If a selective response has been initiated and controlled by a certain stimulus, and if the response can still be made successfully in the absence of that stimulus, then the subject must be using something that functions for the stimulus in initiating and guiding the correct response. Our investigation thus forces us to the consideration of the functional presence of a representative factor in the behavior of animals and children. Not only this, but the problem of the nature of this representative factor confronts us. Is it an overt motor attitude, or not? If not, is it sensory or imaginal, i.e., ideational?

In the interpretative study, I shall proceed on the assumption that animals are conscious. What the nature of this consciousness is, it will be the task of this paper to help determine. (If the reader does not choose to follow this line of interpretation, he may state everything in neurological terms without marring the significance of this discussion.) But *a propos* of the term "image" or "idea," let it be said once for all that wherever these terms are used by the present writer with reference to animal consciousness, they should be supplemented by the phrase "or functionally equivalent process." I use the structural term chiefly for the sake of its brevity.

II. CRITICAL REVIEW OF HISTORICAL DATA

In the interpretative discussion at the close of the present monograph, we shall be confronted with the possibility that images or ideas [2] may have guided the reactions of the subjects. In that discussion, we shall assume that there is no necessity that psychology postulate such a representative factor save where successful reactions occur in the *absence* of the stimulus (object) or movement that is represented. In the present historical section the attempt is made: (1)To present the main types of behavior that have been used as evidence of the existence of images in animals; and (2) to show that this evidence is inconclusive, because the behavior may be stated in sensori-motor terms. In the light of the assumption just made, there are two reasons why this behavior may be so interpreted: (1) The stimuli determining the reactions in question have not been adequately known; and (2) inasmuch as this is true, one has no right to assume the absence of the stimuli which are supposed to be represented. All of the behavior that is summarized in this section *may* have involved representative actors. The point of my criticism will be that they *need* not have involved such processes. It is not merely a question of the application of the law of parsimony, as that is usually stated. It is also a recognition of the fact that sensori-motor behavior is genetically the more fundamental form.

---

[2] In the literature, it has been taken for granted that the question of the existence of images and that of the existence of ideas in animal consciousness is the same. I shall proceed on the assumption that images are centrally aroused processes, while ideas may be either peripherally or centrally conditioned. The essence of the idea is not its origin (or content), but its function. This point will be amplified in the final divisions of this monograph. The present statement will suffice for a definition of terms.

The following are the types of evidence to be considered: (1) Imitation; (2) use of tools; (3) dreams; (4) nature of the learning curve; (5) memory; (6) Thorndike's test: The immediate reaction to one stimulus before the appearance of a second which has always accompanied the first after an interval of a few seconds; (7) recognition; (8) learning by being "put through;" (9) rate of forgetting; (10) association by similarity; (11) reluctancy and expectancy of response; (12) varying means to the same end; (13) reactions to a temporal series of colors, and (14) Washburn's cat on the stairway.

1. Imitation

Thorndike[3] is an example of the comparative psychologist who interprets the highest type of imitation as requiring the presence of images or ideas. In his experiments, however, he found no evidence for the existence of this kind of behavior. The general character of the imitation experiment is well known. An animal that has failed to solve a certain problem is confined where it can see another work the mechanism and get food. It is then given an opportunity to make the desired reaction. If the trial succeeds or if there is a sudden improvement in the animal's behavior, it is said to have profited by viewing the other's performance. Haggerty[4] found this behavior in well controlled tests with monkeys. He divides the stimulus for that imitative behavior into three parts: (1) A fairly simple mechanism; (2) the perception of another animal working at the mechanism, and (3) the perception of the other animal getting food. Haggerty does not discuss the theoretical side of imitation and argue for the existence of images. He simply presents the data. However, in view of the stand taken by Thorndike and others on interpretation, we shall nevertheless use material drawn from Haggerty's monograph for analysis.

---

[3] Thorndike, E. L. Animal Intelligence. 1911, New York, pp. 76–108.

The following criticisms tell against the use of this type of behavior as crucial evidence for images: The animal that does the imitating may make its improvement under the incentive of a social impulse rather than of the apprehension of relations. This receives confirmation by the fact that Haggerty's monkeys did better if the animal to be imitated was a stranger and thus aroused the imitator more strongly than a familiar animal would have done.[5] This criticism is a variant on the following one. (2) The fact that the sight of the other animal *being fed* was a part of the stimulus makes it at least possible that the imitator's attention was simply drawn very vividly to the spot to be attacked. Of course the more complicated the reaction to be made and the more exact the execution of this by the imitator, the better the argument for an ideational perception of relations. However, the general objection will always be valid that one can never say that the imitating animal was not guided solely by stimuli present to sense. The determining factor in the stimulus can not be said to be ideational. Once the animal's attention is vividly focused upon the objective sequence "pulling string—getting food," e.g., the necessary reaction may follow by association when the opportunity presents itself. Monkeys in particular have such an enormous repertoire of reactions that it is very tempting to analyze such imitative reactions as Haggerty presents on a purely "stimulus and response" basis. That author says of one of his typical experiments (Chute Experiment A): "In order to secure the food, the monkey must leap from the wire part of the cage to the chute, and, while holding to it, must thrust a hand up inside and pull the string, thereby releasing the small door in the top of the cage and allowing food which had been placed on it to fall to the floor. He must then descend to the floor to get the food." [6] *After the imitator's attention is focused upon the hole at the chute's end* due to the action of the imitatee, what is more natural than that it should jump to the chute? The hole has "caught its eye" before the jump, so the hand goes in almost reflexly, as reflexly closes about the string and pulls. Food falls and is eaten. If the animal is attentive to the movements during the performance, the chances are that it will henceforth succeed.[7]

---

[4] Haggerty, M. E. Imitation in Monkeys. *Jour. of Comp. Neur. and Psy.*, 1909; vol. 19.

[5] Op. cit., p. 436.

2. Use of Tools

A second argument for the presence of ideas is the use of tools by animals. In view of the fact that such behavior has at times been exclusively claimed for man, students of animal behavior have long sought for conclusive evidence on this question.[8] We shall take typical data presented by Hobhouse for consideration. This will also lead to an understanding of that author's attitude on the question of images. Hobhouse treats such behavior largely under the heading "Articulate Ideas." An example will best lead us to an understanding of his position. The animals used were monkeys, one a Rhesus and the other a chimpanzee. The latter had already learned to throw a rug over food placed at a distance in order to rake in the latter. He was then taught to substitute a stick for the rug. Quotations from the author will now indicate the animal's progress. "Next day, the chimpanzee learnt to use a short stick in order to reach a larger one, with which in turn he could reach the banana." [9] "One day I gave him a rope with a noose to throw over the box in place of his stick." (The banana was placed in a cigar box.) "I did not give him any hint, but he soon tried it in a vague way. He did not, however, understand the matter very well, for when he succeeded in getting the rope round the box, he did not seem aware of his advantage, flung it away, went off for his shawl, and used it very successfully. I then tied a block of wood to the rope to assist in throwing it. He attempted this spontaneously, at first without success. Presently, however, he happened to pitch the block right into the box, which today was open, pulled it in, and got the banana. Notwithstanding this signal success, he never took to this trick." [10] "In the experiment to which I have already referred, when the box was tied to a rope, the further end of which was passed over a stanchion several feet from the cage, he failed, as I shall mention later, to find the right method, but was fertile in devising wrong ones. He would shake the rope violently, so that the banana would fall out of the box. He would then swing the rope to and fro, swishing the banana about from side to side, until by degrees it would come within his reach, in a way which I should have thought beforehand to be quite impossible." [11] "In these tests," says Hobhouse, "it was necessary that [the monkeys] should grasp how the stick and the food stood in relation to them; that they should get the stick at the food and beyond it." [12] "A form of 'analogical extension' is also strongly marked in the use of substitutes differing very widely in appearance and the manner of use from the object first employed." [13] These illustrations of the use of tools are examples and proofs of the existence in monkeys of what Hobhouse means by the *practical judgment*, where articulate ideas are employed.[14] The author explains articulate ideas as follows: "By a more articulate idea, is meant one in which comparatively distinct elements are held in a comparatively distinct relation." [15] The nature of the practical judgment is set forth as follows: "It is more than assimilation, because what is revived is an idea, a definite reference to something unperceived. It is more than association, because relation between the 'revived' idea and the given perception is an essential part of it, and it is less than analytic thought, because the relations involved are not dissected out as distinct elements in consciousness."[16] "The practical judgment is not independent of associations, for association supplies the whole of its material. But out of that material, it selects what it wants, and shapes it as required."[17] This "material" that association presents is ideational as the quotation from page 117 indicates. It seems, though I would not be sure, as if Hobhouse assumed the existence of ideas and is only concerned with the possibility of their functioning in behavior. As a basis for this imputation, I point to his discussion of the association of ideas on page 114 and to that on pages 200–1. In the latter place, he makes clear (?) that what he does not wish to attribute to animals is the conscious analysis of the perceptual order. Such a distinction between existence and efficient functioning in behavior seems to be theoretically permissible.[18] Images, ideas *may* exist sporadically as has been claimed in the case of animal dreams. But comparative psychologists have neither the right nor the need to assume the existence of such processes save as that may be forced upon them by the evidences of behavior.

---

[6] Op. cit., p. 355.

[7] Vide Hobhouse, L. T. Mind in Evolution. London, 1901, p. 202 for place of accident in learning.

[8] Lindsay, W. Lauder. Mind in the Lower Animals in Health and Disease. London, 1879, vol. I, chaps. 23 and 24.
Hobhouse, L. T. Op. cit., chap. 10.
Also many recent studies in imitation.

[9] Op. cit., p. 236.

---

[10] Op. cit., pp. 237–8.
[11] Op. cit., p. 238.
[12] Op. cit., p. 241.
[13] Op. cit., pp. 241–2.
[14] Op. cit., p. 269.
[15] Op. cit., p. 234.

The question now is: Does the *use* of tools[19] such as described imply the presence of a centrally aroused factor? In the light of the above analysis of imitation, the reply is no. Even if Hobhouse's results be fully accepted without raising the question of careful controls, one need not accept his interpretations. The behavior may have been controlled entirely by sensory factors. As to the fertility shown by the animals in devising methods, (see above, p. 6), this was very probably but a random use of acquired co-ordinations. The use of the tools was acquired as any habit and the sight of the individual objects (ropes, etc.) aroused the *type of reaction* that had been taught. This shows a higher grade of intelligent adaptability in the animal than if it had been limited to the use of one object, but it does not prove the existence of a central conscious factor. It may be that such animals as the primates are able to give similar responses to different sensory stimuli on account of a factor of "hyper-excitability." I hesitate to use such a term, but the general type of case held in mind is illustrated by the animal that is supposed to react to a certain stimulus, but, being on the *qui vive*, reacts to anything that occurs at the proper moment. This behavior is familiar in human reaction experiments. If, now, we subtract the possible emotional disturbances (and I doubt whether that even is necessary), we have the type of case, I believe, that the experiments of Hobhouse present.

---

[16] Op. cit., p. 117.

[17] Op. cit., p. 264.

[18] We shall see below (p. 9) that Morgan makes the same assumption.

[19] Hobhouse cities (op. cit., p. 258) only one well authenticated case of the making of a tool by an animal. The tool in this case was, as he notes, a very simple one.

3. Dreams

A third argument used for ideas is the supposed fact of an mal dreams. The usual criticism of this—to which I subscribe—is that the law of parsimony forces one to recognise that the interpretation of the facts may as well or better be physiological than ideational.

4. Learning Curve

A fourth argument used in the discussion as to the presence of ideas is the nature of the learning curve. In 1898, Thorndike[20] presented data for cats which when plotted gave what the author termed a "gradual slope." "The gradual slope of the time curve,—shows the absence of reasoning." It represents "the wearing smooth of a path in the brain, not the decisions of a rational consciousness." There seems to be no doubt but that Thorndike meant that had *ideas* been present to guide the reactions that the latter would have succeeded within a few trials. Hobhouse would seem to agree with Thorndike that such a curve as the latter claimed to present was evidence of the absence of imagery. His criticism of Thorndike is to the effect that the former's curves are *not* gradual—"unless the slope of a church steeple is gradual."

The (apparently) common assumption of these writers has been questioned effectively both by Watson[21] and by Hicks and Carr.[22] The criticism of the latter authors is factual and is summed up as follows: "Our results indicate that any inference from such a general characteristic of a curve is not feasible, because we are dealing with a complex phenomenon due to several independently variable factors. Our results indicate that the rational status of a group of animals can not be inferred from the slope of a curve in so far as this slope is dependent upon the number of trials or the relative rate of elimination. They indicate, moreover, that inferences as to intelligent status are legitimate in so far as the slope is determined by the factor of total values eliminated, but that the relation between the abruptness of slope and the degree of rational ability is just the inverse of that assumed by Thorndike and Hobhouse."

---

[20] Thorndike, E. L. Animal Intelligence. *Psy. Rev. Mon. Supp.*, 1898, vol. 2, p. 45.

[21] Watson, J. B. Kinaesthetic and Organic Sensations. *Psy. Rev. Mon. Supp.*, 1907, vol. 8, pp. 23–4.

[22] Hicks, V. C. and Carr, H. A. Human Reactions in a Maze. *Jour. of Animal Behavior*, 1912, vol. 2, pp. 116–118.

5. Memory

Arguments for the existence of ideas, have also been drawn from behavior purporting to be guided by memory—in the psychological sense. Let us use an example from Lloyd Morgan. The quotation of a few sentences will adequately represent his position when the Introduction to Comparative Psychology was written. "In the first place we may notice that the existence of memory is implied in the association of ideas; or rather in the occurrence of ideas at all." "If, therefore, animals have ideas at all—and if they have not we need not attempt to carry any further our investigations into zoölogical psychology—they must have memory, and there must be in them, as in us, some anatomical and physiological basis for what is popularly termed the retention of ideas." [23] By idea Morgan understands any centrally aroused conscious process. Of course Thorndike's results showed long ago that the presence of ideas in an animal requires vigorous proof rather than mere assumption. Now for a concrete example: "When I was at the cape I used to take my two dogs up the Devil's Peak, an outlying point of Table Mountain. There were several places at which it was necessary that I should lift them from ledge to ledge since they could not scramble up by themselves. After the first ascent they always remembered these places and waited patiently to be lifted up. On one of our first ascents one of them put up a young coney and they both gave chase. Subsequently, they always hurried on to this spot, and though they never saw another coney there, reiterated disappointment did not efface the memory of that first chase, or so it seemed. I think the last time I took them up must have been about three and a half years after the coney

[23] Morgan, Lloyd. Intro. to Comp. Psych. London, 1898, p. 117. Thus Morgan, as we noted for Hobhouse, seems to assume that ideas exist whether they function in behavior or not.

hunt: so long had the memory endured and the association remained uneffaced." [24]

This is a fairly well known example of the type of proof used by the "anecdotal psychologists." To some it may seem too trivial either for serious analysis or notice. But such a judgment is ill informed. We shall find similar arguments as late as Cole's paper on the Intelligence of Raccoons. The obvious criticism of Morgan's illustrations is that they may be simply cases of sensory recognition of the commonest kind. A further word will be said in connection with the criticism of Cole's work.

6. THORNDIKE'S TEST

A great many of the experiments which Thorndike presents in his recent book on Animal Intelligence[25] involve more or less intimately the question of the existence of images. However, I shall limit my analysis to the case in which the problem of the fact of images is most crucially attacked. The case I choose is the famous one reported in the first monograph of Animal Intelligence. I shall term it the "hand-clapping test" with cats. Thorndike's own words are such an excellent example of scientific description that I shall quote them at length:[26] "The only logical way to go at this question and settle it is, I think, to find some associations the formation of which requires the presence of images, of ideas. You have to give an animal a chance to associate sense-impression A with sense-impression B and then to associate B with some act C so that the presence of B in the mind will lead to the performance of C. Presumably the representation of B, if present, will lead to C just as the sense-impression B did. Now, if the chance to associate B with A has been improved, you ought, when the animal is confronted with the sense-impression A, to get a revival of B and so the act C. Such a result would, if all chance to associate C with A had been eliminated, demonstrate the presence of representtions and their associations. I performed such an experiment in a form modified so as to make it practicable with my animals and resources. Unfortunately, this modification spoils the crucial nature of the experiment and robs it of much of its authority. The experiment was as follows:

---

[24] *Ibid*, p. 118.

[25] Thorndike, E. L. Animal Intelligence. New York, 1911.

[26] *Ibid*, pp. 110–112.

"A cat was in the big box where they were kept (see p. 90) very hungry. As I had been for a long time the source of all food, the cats had grown to watch me very carefully. I sat during the experiment, about eight feet from the box, and would at intervals of two minutes clap my hands four times and say, 'I must feed those cats.' Of course the cat would at first feel no impulse except perhaps to watch me more closely when this signal was given. After ten seconds had elapsed I would take a piece of fish, go up to the cage and hold it through the wire netting, three feet from the floor. The cat would then, of course, feel the impulse to climb up the front of the cage. In fact, experience had previously established the habit of climbing up whenever I moved toward the cage, so that in the experiment the cat did not ordinarily wait until I arrived there with the fish. In this experiment

A=The sense-impression of my movements and voice when giving the signal
B=The sense-impression of my movements in taking fish, rising, walking to box, etc.
C=The act of climbing up, with the impulse leading thereunto.

"The question was whether after a while A would remind the cat of B, and cause him to do C before he got the *sense-impression* of B, that is, before the ten seconds were up. If A leads to C through a memory of B, animals surely *can* have association of ideas proper, and probably often *do*. Now, as a fact, after from thirty to sixty trials, the cat does peform C immediately on being confronted by A or some seconds later, at all events before B is presented. And it is my present opinion that their action is to be explained by the presence, through association, of the idea B. But it is not impossible that A was associated *directly* with the impulse to C, although that impulse was removed from it by ten seconds of time. Such an association is, it seems to me, highly improbable, unless the neurosis of A, and with it the psychosis, continues until the impulse to C appears But if it does so continue during the ten seconds, and thus get directly linked to C, we have exactly a representation, an image, a memory, in the mind for eight of those ten seconds. It does not help the deniers of images to substitute an image of A for an image of B. Yet, unless they do this, they have to suppose that A comes and goes, and that after ten seconds C comes, and, passing over the intervening B blank, willfully chooses out A and associates itself with it. There are some other considerations regarding the behavior of the cats from the time the signal was given till they climbed up, which may be omitted in the hope that it will soon be possible to perform a decisive experiment. If an observer can make sure of the animal's attention to a sequence A-B, where B does not arouse any impulse to act, and then later get the animal to associate B with C, leaving A out this time, he may then, if A, when presented anew, arouses C, bid the deniers of representations to forever hold their peace."

First as to the data obtained, Thorndike's results indicate only the magnitude of the interval between two stimuli which association can bridge. Using his symbols, B and C have been associated before this experiment was begun. The hand clapping, A, now precedes B by ten seconds. At the end of from thirty to sixty trials, the cat climbs up at A rather than waiting until B appears. Now must we assume either that the "A" neurosis, and hence the "A" psychosis, persists or that A has resulted in the central arousal of B? Not at all. There is good evidence to show that association in animals can bridge an interval of ten seconds and more. Nearly all behavior experiments cover at least ten seconds from the beginning of the test to the acquisition of food. Yet it is necessary that the first and the last of the test be associated in order to provide a motive for the complete reaction. In no case—Thorndike's not excepted—is the ten seconds a sheer gap. (Thorndike did not describe the behavior of the cats during the interval, although he did refer to it.) The animal is reacting during the interval. Motor attitudes at least are present to fill the gap. An animal as high in the scale as a cat could certainly form this simple association between a sound and a single reaction within sixty trials. Moreover, it is to be remembered that only two cats succeeded within this time. Two others were tested for one hundred and thirty-five trials, but uniform reactions were not secured. The situation would have been quite different had there been two or more signals, "A's," and as many different responses. But even under such conditions, one would still be studying the association of stimulus and response. This would remain true as long as it was the *feeding* and not the animal's *reactions* that were delayed. On the other hand, if both the feeding and the reactions were delayed after the stimulus had been given, then *if there were such states as ideas* one would expect them to function here. Furthermore the need for ideas would increase with the number of different stimuli and reactions.

Just a word now concerning Thorndike's formula for the study of imagery. The fact that he himself was unable to carry out experiments in conformity with it, and that none have been carried out since his attempt, does not speak very well for the formula. I must confess my own failure as yet to perfect a technique by which the formula might be applied to animals. In order to associate A and B, it will be necessary that they be followed by a reaction x. A, B and x are now associated. B and C may now be linked together through a second reaction y. Even granting the ideational character of reactions carried out according to the formula, one would have to know the following facts concerning the above test: (1) Did the animal discriminate between A and B, between B and C, and between A and C? If the first and second discriminations were not made, A and B or C would have been directly associated through x or y. If A and C were not discriminated, the association B-C would have been useless. Difficulties such as these lead me to believe that the goal aimed at is unattainable. In fact, Thorndike states that the formula is valid only when B arouses no impulse to activity; this is the essential weakness of the formula, for one can never be certain of the absence of these intervening mediating motor tendencies. In fact their presence is extremely probable. It cannot be too often reiterated that structural psychology has no place in the study of animal behavior. One must speak in terms of function. It is impossible to tell whether an *image* is present or not. The most that one can ever say is that some process other than overt motor activity is present which functions as an image might in human consciousness. This amounts to an acceptance of Hobhouse's statement (although I do not feel that he always limits himself to this) that the ideas we deal with are "practical ideas," understanding by this a *function* which does for animals that which practical ideas do for human behavior.[27]

7. Learning by Being "Put Through"

Perhaps the most important and best known piece of work on the presence of imagery in animals is that by Cole on the Intelligence of Raccoons. Let us consider the evidence which Cole presents. The argument derived from an animal's learning a problem by being "put through" may be analyzed first. Cole writes in particular reference to Thorndike, saying "It would seem that nine-tenths of the experimental evidence for the absence of ideas in dogs and cats comes from their inability to learn from being put through."[28] Again, "If inability thus to learn is evidence against the presence of ideas, then ability to do so should be equally strong evidence for it."[28] In an earlier paper,[29] I have discussed some aspects of this problem in the light of experiments carried out upon the white rat. This phase of the question need not be gone into more fully here. Whether or not it seems probable, from a speculative point of view, that an animal must use "free impulses" or images in order to learn from being "put through," we need not consider. My contention in the paper mentioned is that the data so far at hand do not warrant conclusions as to the presence of imagery. Furthermore I indicated that the behavior could be explained better in other terms. Now with reference to that type of experiment in which the problem learned is that of working latches rather than climbing into boxes, I believe the data presented by Cole are conclusive, as far as the facts are concerned. Some raccoons at least appear to learn by being "put through." Whether all raccoons would do so is, of course, quite another matter. But given the fact, it does not follow that one must necessarily interpret it as an evidence of the presence of images. Cole seems to have carried over this interpretation rather uncritically from Thorndike. The entire process can be adequately stated in sensational terms. Certain stimuli, x, y, and z, e.g., are made prominent by directing the animal's attention to them. These stimuli occur in connection with one another and with certain movements, kinaesthetically reported, and are followed by the acquisition of food. What could be more natural, then, than that the cognizance of the stimuli should set off the associated movements? The behavior noted by Cole bears out this contention. All four raccoons, both the pair put through and the pair not put through, solved the problem of escaping from the box (No. 4) by working the fastenings at one trial in one manner and at another in another fashion.[30] This need mean no more than that several responses, as opposed to a fixed series, might follow upon certain stimuli. This would be a higher type of behavior, to be sure, than where only one response was given, but it would not therefore involve a new type of conscious process. "If the act which he (the raccoon) is put through is the one which will remain the easiest and the most convenient for him throughout the tests, irrespective of his position in the box, he will never vary from it. If not, he will employ your act when his position makes it convenient and he is looking at the latch you began with."[31] We are not told whether the raccoon learned which was the easiest way by trial and error or not. But it is to be inferred from the behavior of raccoon No. 2 that such was the case.[32] The behavior thus described is interesting, but entirely inadequate as far as the presence of imagery is concerned. It may well be that "animals which, so far as we know at present, are utterly unable to learn save by innervating their own muscles" are devoid of ideas, without its following that if this type of learning is present, the animal possesses imagery. Hence assuming the facts that Thorndike and Cole present to be unquestionable, it need only follow that the raccoon exhibits more complex sensori-motor behavior than the dog and the cat, and not that it shows a new type of behavior, i.e., a type of behavior involving the functional presence of a representative factor.

---

[27] Hobhouse, L. T. Mind in Evolution. New York, 1901, p. 283. That Hobhouse does not limit himself strictly to this may be seen by reading the first few sentences on p. 284.

[28] Cole, L. W. Concerning the Intelligence of Raccoons. *Jour. of Comp. Neur. and Psych.*, vol. 17, 1907, p. 249.

[29] Hunter, W. S. A Note on the Behavior of the White Rat. *Jour. of Animal Behavior*, vol. 2, 1912.

Cole adduces further evidence for the presence of imagery.[33] These may be listed as he himself presented them: (a) Recognition of objects; (b) forgetting; (c) variability; (d) association by similarity; (e) reluctance and expectancy; (f) varying means to the same end, and (g) reactions to colors presented in a temporal series. (c was treated under 7, above.) Most of these arguments can be dismissed summarily. It should never be forgotten that although almost any type of behavior *may* involve imagery, the comparative psychologist is seeking for behavior whose explanation *requires* the assumption of such a function, even under the law of parsimony. Is the determining sensory stimulus present or absent at the moment of response? If it is present, why *should* the animal use a representative factor? These are the questions that every investigation as to the presence of images in animal consciousness must face.

---

[30] Op. cit., p. 243.
[31] Op. cit., pp. 245–6.
[32] Op. cit., p. 246.
[33] Op. cit., p. 251, ff.

8. Recognition

It seems to me extremely obvious that the fact of the recognition of a food bottle need not be interpreted as presupposing imagery. In fact it is hard to understand how imagery would function in such a situation! Recognition of this type does not necessarily imply memory or the dating of an experience in one's past. On this basis all animals must be granted the possession of images.

9. Rate of Forgetting

The fact that some of the raccoons forgot the solution of the boxes after an interval of three days does indeed indicate, as Cole claims, that automatisms had not been set up. But one must not infer therefore that images were involved. There is no factual support for the assumption that imaginal forgetting is more rapid than sensory. The same is true of the variable nature of the raccoons' behavior discussed above. This very probably indicates a high order of adjustive ability on the sensori-motor level, but not necessarily an "imaginative" adjustment. Mere variability of response is present in all animals. Do all animals, then, possess images?

10. Association by Similarity

"Association by similarity," or the fact that a raccoon will attack a certain fastening even after its location in the box has been changed, when contrasted with the activity of cats[34] and rats[35] that attack the old position rather than the old fastening, proves for raccoons only the superior importance of "objects,"—or the form, size and quality aspects of the stimulus,—over kinaesthetic space controls, i.e., the position aspects of the stimulus. In addition, it should be noted that Davis in his study of raccoons[36] obtained data of the opposite nature. His animals would claw at the spot where the fastening had been. But aside from all this, I see no reason why "association by similarity" should not be purely perceptual and hence be simply a type of recognition. As a matter of fact, all animals have responses (instinctive reactions for example) that are applied to classes of objects. Someone also has well said that animals, in cases like the present ones, simply *fail to see the difference* between two objects and hence react as though the two were the same.

---

[34] Cole, L. W. Op. cit., p. 253.

11. Reluctancy and Expectancy

Is the "reluctancy" or the "expectancy" which appears to be manifested in an animal's behavior toward a difficult and an easy box respectively to be taken as evidence of the presence of imagery? Cole, e.g., says "no one who saw the animals resist being put into a box failed to credit them with a rather distinct memory of the difficulty of escape."[36a] By "distinct memory" Cole undoubtedly means an imaginal process. But *do* the facts prove this? Is the case not perfectly amenable to a "stimulus and response" explanation? The raccoon has associated a certain box with a certain displeasure until the presentation of the box arouses immediately the negative reaction. The raccoon *may* have had images of his previous experiences, but the facts do not prove it. One does not *need* images to explain this behavior any more than to explain a child's refusal to take a second dose of bitter medicine.

12. Varying Means to the Same End

The data presented by Cole under the heading "varying means to the same end" are just as inconclusive as that presented above, although they are more suggestive. We have here the activity of four raccoons directed toward entering a box containing an apple. The raccoons were accustomed to reaching through a hole in the top of the box in order to procure the fruit. When a block with a steeple in it was placed in the hole, one raccoon immediately clawed out the block and ate the apple. "She seemed to work as if actuated by a thought of the apple in the box. It was not done by random clawing, nor could she smell or otherwise perceive the piece of the apple in the box."[37] We are not informed *why* the animal could not smell the apple. The fact that the fruit odor was in the room will not suffice. But even assuming this to have been controlled, we need not attribute an image of the apple to the animal. Habit got the raccoon to the hole and started her paw, and the contact (?) of the staple initiated the claw reflex. This plus the pleasurable results associated with the box are sufficient to explain the activity. In a slightly different experiment, the animals crawled through a hole in the top of the box in order to procure the apple. I now quote Cole: "The box had no bottom and instead of resting directly on the floor it rested on a row of bricks. Removing one of these made an opening under the lower edge of the box through which the raccoon might crawl. The opening in the top was now closed and nailed fast. No. 1 was freed, went to the top of the box and tried to claw out the block. He then walked about the room, then tried the block again. He then went to the opening made by removing the brick, stopped a moment, then crawled in."[38] To argue that this means *image* of apple is certainly naive, at least. Could the raccoon not sense the apple when its nose was within a foot (see description of box 18, op. cit., p. 215) of it? Again where the animal climbed up and over a roll of poultry wire in order to descend into the box, the possibility of the presence of imagery is only suggested, not proved. The opening into the box, as well as the odor of the food, was there impelling the raccoon to approach. What more natural, then, than that the animals should climb the wire and thus reach the food. Such behavior is what would be expected of raccoons that lived in a wire cage. The case of raccoon No. 4 is somewhat different. With the box which possessed two openings, he went directly into the lower of the two at the first trial. What influence his starting point in approaching the box had upon his success, we are not told.

---

[35] Richardson, Florence. A Study of the Sensory Control in the Rat. *Psych. Rev. Mon. Supp.*, vol. 12, 1909, p. 38, e.g.

[36] Davis, H. B. The Raccoon: a Study in Animal Intelligence. *Amer. Jour. Psych.*, vol. 18, 1907, p. 470.

[36a] Op. cit., p. 253.

---

[37] Op. cit., pp. 254–5.
[38] Op. cit., p. 255.

Logically, the position taken by Cole in his illustrations would require him to argue that ideas are present wherever "motor excess" in learning occurs. There a sensorially reported situation calls out in succession the animal's repertoire of instinctive and habitual acts. This is a variation of means toward the attainment of an end, and is on a par with the "variability of response" argument discussed above.

13. Reactions to a Temporal Series of Colors

It is only fair to Cole to note that his main emphasis does not rest upon the above data, but upon a series of tests that he made with colors presented in a temporal series. Three colors, white, blue and red, were placed upon three levers which in turn were secured by a single pivot on the back side of a board one foot high. When the colors were presented in the order W, B, R, the animal was to secure food by climbing upon a box. When R, R, R was given, no reaction should be made. Now since the terminal stimulus was identical in each case, Cole argues, the only means by which the animals could react discriminatingly is by remembering what colors of the series had preceded. The fact that the raccoons clawed up the cards from behind the screen, reacting only when the proper one appeared, was also used as evidence of images. Believing that these tests were almost absolutely uncontrolled and that the interpretations were invalid as far as the data presented were concerned, I set two graduate students, F. M. Gregg and C. A. McPheeters at work upon this problem. Their purpose was: (1) to duplicate as nearly as possible Cole's results under adequately controlled conditions, and (2) having set up the discrimination, to determine and not to assume its basis. Their results will soon appear in the Journal of Animal Behavior under the title Some Reactions of Raccoons to a Temporal Series of Stimuli. I shall only note here that they found: (1) that discrimination was not based upon the cards—in fact the discrimination was not even visual, and (2) that practically the entire discrimination was made on the basis of the first lever and not on the basis of all levers as Cole assumed. (Since all levers were influential, in Cole's opinion, it had been necessary to assume that the first two were represented imaginally when the last was presented.)

The criticisms on Cole's entire work as outlined above reduce to these: (1) The facts are either inconclusive or irrelevant. And (2), there is no evidence of adequate controls. On the positive side, the work suggests that the raccoon is more intelligent than the dog and cat, but it does not determine wherein this superiority lies.

14. Washburn's Cat on the Stairway

There is one other type of behavior that deserves mention. Again, it was not and need not be interpreted as necessarily involving the presence of imagery. The illustration follows: "A cat, indeed, once observed by the writer, did behave as a human being would do to whom any idea had occurred, when, on coming into the house for the first time after she had moved her kittens from an upper story to the ground floor, she started upstairs to the old nest, stopped halfway up, turned and ran down to the new one. But errors of interpretation are possible at every turn of such observations."[39]

This is an excellent illustration of the type of argument that would use "hesitation" and "wavering" as an evidence for the presence of ideas. It is a mode of behavior that is found almost everywhere in animal studies. A rat, e.g., hesitates at a division point of the maze and finally selects the right pathway, or it runs *half* the length of a blind alley and then turns back. Was it guided by an ideational representation of the movements to be made and their consequences? Not necessarily. Accidental stimuli may have initiated the new reaction and any conflict present may have been resolved on a purely sensory-motor level. The experimental technique for the control of such reactions will be discussed below (see p. 74).

There is very little that needs to be said in the way of a summary of this historical review. All of the arguments for the presence of imagery in animals that we have examined have been found inconclusive. It is not that the various types of behavior may not have involved a representative factor. The point is that this possibility is nowhere proved necessary. The fault does not lie in the exhaustiveness of the data. The various methods have been made to yield ample returns for this purpose. The crux of the matter is that the methods themselves are inadequate for the solution of the problem. Let me re-emphasize the fact that if comparative psychology is to postulate a representative factor, it is necessary that the stimulus represented be absent at the moment of response. If it is not absent, the reaction may be stated in sensori-motor terms. But in order to know that the stimulus is absent, it is first necessary to determine carefully what the stimulus is. None of the methods reviewed, I believe, meet these requirements. Whether the tests presented in this monograph do or not, the reader himself may judge.

---

[39] Washburn, M. F. The Animal Mind. New York, 1909, p. 272.

III. NOTES ON THE ANIMALS AND CHILDREN TESTED

Four classes of re-agents were used in the experiments whose description is to follow: white rats, dogs, raccoons (Procyon lotor) and children. A few words descriptive of these subjects will not be amiss.

1. Rats

Twenty-two rats were used during the entire course of the experiments. Five of these were normal adults and were used only in preliminary tests in which the purpose was the perfection of a method. The remaining seventeen (normal) were all started in the experiments when approximately four weeks old. All were vigorous, healthy animals whose records may stand as typical.

2. Dogs

The two dogs tested were mongrels in whom the rat terrier strain was dominant. They were very bright and intelligent looking, very active, playful and affectionate,—indeed they seemed to possess all the qualities that are attributed to intelligent dogs in countless anecdotes. This was the unanimous testimony of many observers. The two dogs, Blackie and Brownie, both females of the same litter, were secured from an animal dealer when they were small puppies and were started on the preliminary tests at about the age of five months. They were usually kept in a kennel out of doors and remained in excellent condition during the experiments. Of the two, Brownie was the more aggressive and, to the ordinary observer, appeared possibly the more intelligent.

3. Raccoons

Four raccoons, two males—Bob and Jack—and two females—Betty and Jill, were tested. Bob and Betty had been pets and were secured from their owner when about five or six months old. Jack and Jill were caught in the woods when about two and a half months old. Preliminary experiments were started almost immediately with all four. The raccoons were and remained in perfect health throughout the experiments. The only physical defects possessed by any of them were the cataracts which developed in Bob's eyes about a month after his purchase. Although this interfered with his accurate vision of objects and resulted in his colliding frequently with them, he was able to distinguish such changes in brightness as were necessary in the experiments. This fact was demonstrated conclusively by many control tests which will be described later. Of the four, Betty was the quietest and most timid. She was the least promising subject among them. Further facts about these animals are given in the appendix.

4. Children

Five children were used in the course of the present tests: two boys, Hd and L, and three girls, F, M, and H. H, Hd and L were each approximately six years old. M was about eight years old; and F, about two and a half. Hd and L were in kindergarten work, and M and H were in the graded schools. The indications were that they were children both of normal ability and of normal intellectual advancement for their ages. F was a bright little girl and made an excellent subject. All of the children were more or less timid at first; but this was overcome, in all save possibly H's case, before tests were begun. Particular pains were taken with F. The experimenter was in her company a great deal, and by the beginning of the tests was a gladly accepted play-fellow.

IV. APPARATUS AND GENERAL METHOD

The plan of box A is presented in Fig. 1. (This box was used for the raccoons.) The box is made of $\frac{1}{4}''$ boards and is $2\frac{1}{2}'$ high with doors $7\frac{1}{4}''$ wide and $13''$ high. The light stimulus came from 3 c.p. 8 volt miniature carbon lamps, so wired that they might be switched on one at a time. The current was obtained from a 220 volt lighting circuit and was passed through a lamp rheostat before reaching the discrimination box. The release box R was raised by means of a cord passed over a pulley in the ceiling and back to the experimenter at E. The first release box had glass over the top and sides. The right and left faces of the box were 12″ x 15½″. The front was 7½″ x 15½″. With this release box the distances to the entrances of the three light boxes (L) were unequal. Those at the sides were each 19¾″, while the distance straight in front was 20½″. These various inequalities were due to two causes: (1) The box had been planned originally for a different type of test and was only later arranged for the present experiment. (2) The release box, being covered with glass would have been too heavy to handle had it been made larger. During the course of the experiments, another release was made. This one was covered with wire of ½″ mesh. Its sides were 14½″ x 15½″; and its front was 9½″ x 15½″. The distances to the light boxes were now equal and of the dimensions indicated in Fig. 1.

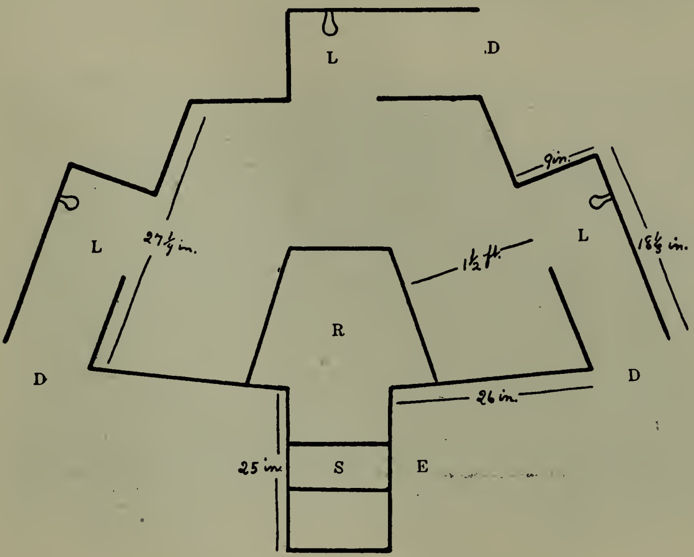


FIGURE 1. Ground plan of Box A

Sliding doors were placed at the points marked D in the figure. They were controlled by strings which ran from them, through screw-eyes on the top of the box, to the experimenter at E.

A 16 c.p. light was suspended about four feet from the floor over the center of the apparatus. Its intensity was diminished approximately by two-thirds by wrapping the bulb in cloth. The three light boxes were covered in order to prevent light from entering them from above. Part of the entrance box leading to the release, R, was covered by the switch-board, S, and the remainder by paste board. This prevented the animals from watching the experimenter.

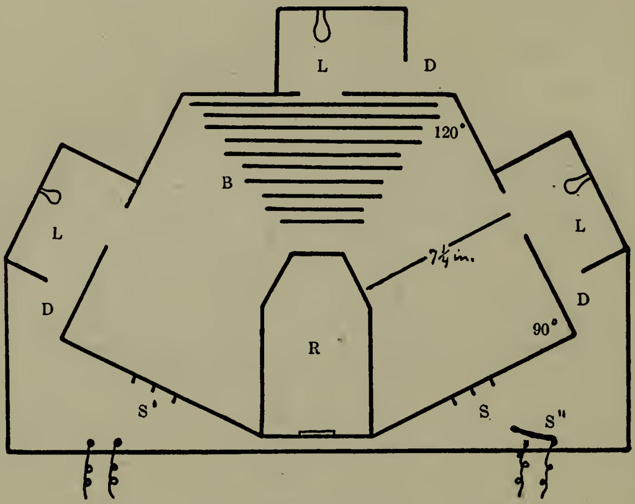


Figure 2. Ground plan of Box C. D, exit door.

Box B was, in principle, like Box A. It was used in testing the dogs. Its dimensions differed from those of A. Instead of being 90 degrees, the extreme lateral angles were 75 degrees. The angles on each side of the middle light box were about 145 degrees as opposed to 127 for Box A. Box B was only 2′ high, and the length of its entrance box was 1′ 4″. The release box was covered with wire, and each face was 1′ x 10″. The distances from the release boxes to the light boxes were each 1½′.

Fig. 2 is a ground plan of Box C. This box was used for rats. In addition to the data there given, the following points should be noted: The release box, R, was fastened by hinges so that when it was raised the three faces cleared the floor practically the same distance. The faces and the front half of the top of R are covered with glass; the rest is of wood. The doors leading into the light boxes are 4″ x 3″. Those leading out of the light boxes, called exit doors here, are 3″ x 2½″. The switches at S′ are for the lights which are of the same intensity and wiring arrangement as those in the two preceding boxes. The switches at S turn the current into any or all of the paths from the release box to the light boxes. This current is obtained from a dry cell and is passed through the primary coil of a Porter inductorium. The strength of the current passing into the problem box was regulated so that the animals never became frightened by severe shocks. The current was never strong enough to cause the animals to squeak and only rarely did they attempt to jump over the strips. The brass strips from which the shocks were obtained (only one group, marked B, is shown in this figure), were very thin and lay flat on the floor of the box. Before being tacked down, they were given an acid bath which destroyed their lustre but left their conductivity practically unaffected for my purpose.

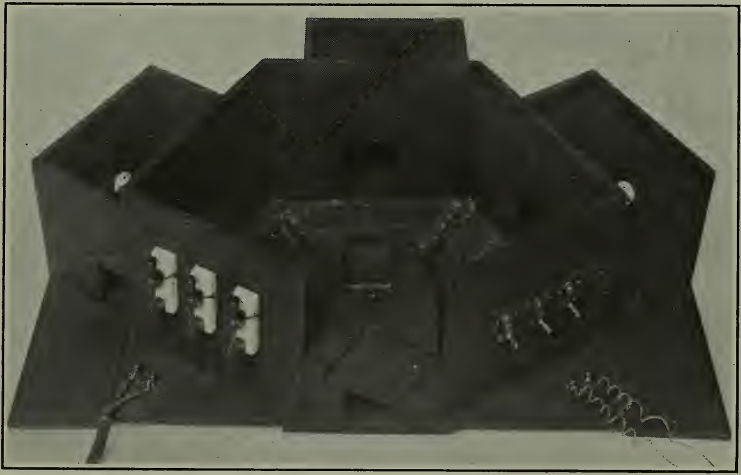


FIGURE 3. Box C

Fig. 3 should give a clear presentation of the essentials of this box as well as of the others used in the course of this research.

Box D, also used for rats, is similar to Box C in all save two respects: (1) It was not wired for punishment. (2) The doors leading from the light boxes could be closed with wooden slides. The use of these slides was discontinued shortly after the experiments began. Pieces of wire mesh were then used. These admitted the light and thus offered less opportunity for the animals to tell which box was open and which was closed.

The apparatus (Fig. 4) which was used with children was constructed on the same principle as that described above for the other problem boxes. Three boards, each one foot square, were placed against the wall of a room 12′ x 14′. The middle square was seven feet distant from the release box, R. On each of these boards was mounted: (1) A 4 c.p. miniature electric light, L; and (2) just below the light, a push button. All three boards were painted black and were exact duplicates the one of the other. The front, A, of the release box was a lever which could be raised by a handle at P. The experimenter usually sat at E. T is a table which held: (1) The candy used as a reward in the tests; (2) the switches regulating the lights and the buzzer; and (3) the buzzer. C is a curtain which hid the experimenter from the subject's view when the latter had

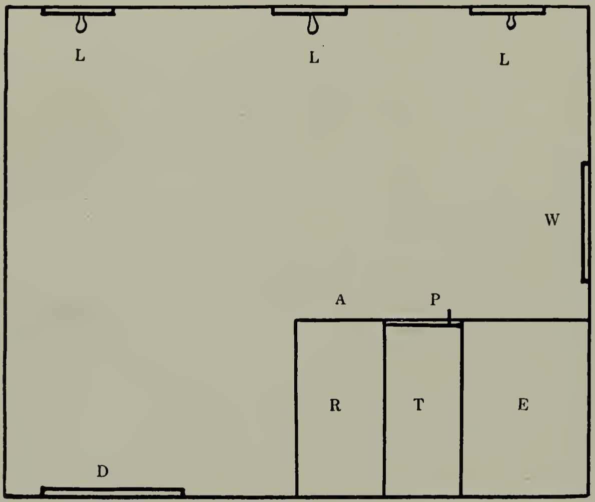


Figure 4. Ground plan of apparatus used with children. D, door; W, window

left the release box. At first this curtain was also continued between R and T. Subsequently, this was found to be both inconvenient and unnecessary and its use was discontinued. The apparatus was wired so that any light could be turned on at will and so that any push button could be connected with the buzzer. Moving the switches was done without the subject's knowledge. The light was always turned on over the button that rang the buzzer. The child's problem was to find this button at the first trial when the light was on (in the learning series) and then (in the delayed reactions) after the light had been turned off for a certain interval of time.

The general method of experimentation was as follows: The animal to be tested was put in the release box, R, of problem Box C, for example. If, now, the lighted box is the one on the left, the exit doors of the others are closed and the switches at S are so set that if the experimenter close the switch at S″, the animal will receive a shock if it steps on either the strips leading to the box on the right or on those leading to the one in front. The light is then turned on in the left box. The animal is released after five seconds, the time being taken with a metronome. A careful, detailed record is kept of the direction in which the animal is oriented[40] when released and of just where it goes after being released. In the case of the animals used in Boxes A, B and C, they should go straight to the lighted box, out through the exit doors and back to the entrance of the release box where they are fed. The rats used in Box D were fed a small morsel of bread and milk at the exit doors of the lighted boxes. Theoretically the olfactory control was not so good here as where no food at all was given in the light boxes. Practically, there was no difference. The rat was given only a bite, so almost no food fell on the floor; all the boxes were used an equal number of times; and all were frequently washed out. Whatever odor was present was so distributed as to afford no appreciable basis for discrimination. The results obtained with these rats, when compared with those where the olfactory control was better, support this statement. In any event, olfactory inequalities would persist after the light was turned out and would aid in delayed reactions only if associated with the light. More attention will be given to this possibility later in the discussion.

---

[40] Orientations are spoken of as right and wrong, irrespective of whether an animal may be said to depend on them as cues or not. When the orientation is "right," the animal is headed toward the proper box. Any other orientation is "wrong."

After the animal had been trained until it chose the lighted box almost perfectly, delays were begun. The light was turned off just as the animal reached the box. This was called the first stage of delay. At the second stage, the light was turned out when the animal was half way to the box. At the third stage, the light was turned out just as the experimenter *started* to raise the release box. Here there was a genuine delay, although a small one. The first two stages served primarily to adapt the animal emotionally to the sudden change from light to darkness. The rats and dogs usually ran so fast that their momentum was sufficient to carry them into the box when once they were started toward it. In any case they only needed to continue in the direction in which they were going. This, however, was not the case with the third stage. *The light was put out before the animal started.* Throughout these three stages, the animal was released promptly at the end of five seconds. From this stage on, where the animal was detained one or more seconds after the light was out before being released, it was obviously necessary to let the animal see the light before this was turned off. Occasionally, the interval thus required was more than five seconds. In these higher stages of delay, I always waited until I felt sure that the animal had seen the light, and then turned off the current while the animal was still oriented toward the source of light. Record was kept of any change in the orientation which an animal made after the light was turned off. How detailed these records were will be seen in the section on experimental results.

The delays were gradually increased in length until one was found at which the animal failed. They were then decreased until the animal was again making a high percentage of correct choices, when the intervals were again increased. An animal was thus tested twice for the limit of its ability to delay with the backgrounds surrounding the entrances to the light boxes all similar the one to the other. When this limit was found, the wall of the box about the entrance to *c* was covered with white cardboard; that about *b*, with a black; and that about *a*,[41] with a medium gray. If the animal's limit of delay was no better or was worse with this arrangement than before, the animal was dropped from the experiment. If the limit were better, the different backgrounds were removed and the similar ones used again. The limit of delay with these was then re-determined. If this third limit were greater than the second, the effect of training could be evoked as an explanation of the fact. But if it were markedly less than the second, the only cause could be an association between the backgrounds and the lights. The significance of this type of association will be dwelt upon in detail later in this paper.

One more point in general method remains to be considered. This is the question of what percentage of correct choices shall be taken as sufficient to justify further increase in the interval of delay. With three discrimination boxes, pure chance would lead the animal to make 33⅓%of correct reactions out of a long series of presentations. But series used in experimentation are very rarely long enough for chance to operate as theory demands. Besides there are various other influences which enter in to determine an animal's behavior above and beyond the influence of the stimulus proper to the test. One such influence is the position factor. Try as I might to eliminate this, most of the animals acquired at various times during the experiments more or less pronounced preferences for certain boxes. And these preferences varied from animal to animal. Sometimes they were so strong that the regular tests had to be stopped until the habit could be broken up. In the light of this, although on the whole each box was presented to an animal an equal number of times, in any one stage of the tests such an equality might not be present. Thus an equality of percentages among the various animals, in this case, would not mean that they knew the problem equally well. Again hesitancies and waverings must be noted in estimating how well the animal is grounded in his appointed task. Further statements concerning the value to be attached to the percentages appear later in the paper (pp. 44, 46 and at intervals thereafter.) Considerations such as these render it highly inadvisable to lay down a rigid standard as to the number of trials and the percentage of correct reactions to be required of all animals. As will be seen in the following experiments some animals were advanced from stage to stage when but 70% of correct reactions were made. Others were detained on one stage until 85% or 95% were made. Sometimes an animal was given 5 or 10 trials, sometimes 150 or 200 trials on one stage of delay. One general fact, however, should be noted: The first set of rats, Bob and Betty during their first year's work, and H, L, M, and Hd of the children were rushed from stage to stage as fast as was at all feasible. The emphasis here lay upon what the subjects *could* do with their native equipment. With the other subjects used and with Bob and Betty during the second year's work, a larger number of trials were given on each stage of delay and the advance in the length of the periods was more gradual. The emphasis here was placed on what the subjects could *learn* to do.

---

[41] a, b, and c will be used in this paper to designate the right, middle and left light boxes respectively.

V. EXPERIMENTAL RESULTS

1. Tests with Animals

A. Learning the Association. (a) Rats.—The method of experimentation used by Hough and Reed was retested with the result that the general method outlined above was adopted. These tests were made upon five normal adult rats, Nos. 18–22.

The regular experiments may be divided into two sets: (A) Those in which reward only was employed; and (B) those in which both punishment and reward were used. Nine rats, Nos. 1–9 were tested in the first set and eight, Nos. 10–17, in the second set. Of the rats in A, Nos. 1, 3 and 8 were in poor health, and their records will not be considered.

Table I gives the number of trials required by the rats of Set A to learn the association between the light and getting food. These rats were given 5 trials daily. All save No. 6 learned the association. Of the last 50 trials given this animal, only 40% were successful; while of the entire 800, 54% were correct.

TABLE I

Rat	No. of trials on learning
No. 2	176
No. 4	175
No. 5	505
No. 6	800
No. 7	361
No. 9	280

The rats of Set B were tested as follows: Nos. 10, 11, 14 and 17 were given 5 trials daily. Nos. 12, 13, 15 and 16 received 10 trials. All of these animals learned the association. The number of trials required for this learning is given in Table II. The results here indicate: (1) That the use of 5 trials favors rapid learning more than does the use of 10 trials, and (2) that rats tested with 5 trials daily under conditions of reward and punishment will learn the association more nearly in the same length of time than will rats given the same number of trials but tested with reward only. The use of punishment, while it may not shorten the length of time required by an "intelligent" rat to learn an association does hasten the learning in the case of the "dullards" such as Nos. 5, 6, 7 and 9. Rats will put forth a maximum effort under punishment when they would not do so under other conditions. These results are in harmony with the work of Hoge and Stocking.[42]

TABLE II

Five trials		Ten trials	
Rat	No. of trials on learning	Rat	No. of trials on learning
No. 10	165	No. 12	440
No. 11	160	No. 13	250
No. 14	200	No. 15	220
No. 17	175	No. 16	480

That the influences on time of learning exercised by the number of trials and by punishment are not due to preferences for the light or for the dark room boxes is indicated by Table III which gives the number of times each rat chose the

TABLE III

Rat	No. 2	No. 4	No. 5	No. 6	No. 7	No. 9
No. of choices of light box	23	21	13	18	23	38
Rat	No. 10	No. 11	No. 14	No. 17		
No. of choices of light box	20	28	28	32		
Rat	No. 16	No. 15	No. 13	No. 12		
No. of choices of light box	24	30	21	27		

---

[42] Hoge, M. A. and Stocking, R. J. A Note on the Relative Value of Punishment and Reward as Motives. *Jour. of Animal Behavior*, 1912, vol. 2.

lighted box during the first 50 trials. The data given for the rats of each group were obtained under similar conditions (for our present purpose) and are strictly comparable. The only cases of marked preferences occur with rats Nos. 5 and 9. No. 5's preferences for the dark boxes will help to account for his slow learning; but it would seem that No. 9 should have learned very rapidly owing to its marked preference for the light box. With the exception of these two rats, all the animals were on an essential par as to preferences. Hence the differences noted in their learning periods must have been due to the different conditions under which they worked. Accidental individual variations are not the causes of these differences because of the number of rats used.

(b) Dogs.—The two dogs, Blackie and Brownie, were given 10 trials daily in Box B under conditions of reward only. The former animal was given 560 trials on the association. Of these, 408 trials or 72% were correct. Brownie was given 650 trials on learning the association. Of these, 396 trials or 60% were correct. Ninety-five per cent of the last 100 trials were successful. The relatively poor showing made by this dog was due to the acquisition of habits that interfered with the proper reaction. Twice during the learning series, extra tests had to be given in order to break up a discrimination now against the right and middle boxes, now against the left and middle boxes. In general, it may be said of both dogs that their rate of learning is no better than that of the rats. Indeed it is much worse than any of the rats tested with reward and punishment and 10 trials daily. The only rat that learned the reaction that did not do much better than the dogs was No. 5. I would suggest that the difference is due to the dogs' "helplessness" when deprived of cues from the experimenter. The following paragraph elaborates this point.

There are several interesting points relative to the dogs' behavior in the learning series that deserve mention. Indeed to a large extent, they are typical of their behavior throughout the entire experiment. When the dogs were first put into the problem box, instead of attempting to get out, they merely sat down and howled. They were out of sight of the experimenter, it will be remembered, and when placed in such conditions seemed quite helpless. They gradually overcame this timidity, helplessness or lonesomeness but, as will be seen in the delayed reaction tests to be described below, they never revealed a high order of resourcefulness. We shall have further occasion to see that their behavior was almost, if not entirely, on a par with that of the rats. In learning the association, e.g., the dogs would go back and forth between some two boxes for many trials before investigating the third box. Often they would stop and look around in an apparent attempt to find the experimenter. This was never done by the rats and raccoons. Again, the brown dog fell into the most absurd habit of going out of the release box, turning entirely around to the left and then going to one of the boxes. This accomplished no end that I could determine, yet it was persisted in for some weeks.

(c) Raccoons.—Bob and Betty were each given 10 trials daily. Jack and Jill received 15. Reward only was used, although running into the wrong box and having to back out constituted no little punishment here as was also the case with the dogs. The experimenter was practically out of sight of the animals all of the time and absolutely so in certain control tests. It will be remembered that the raccoon tests were made in a room illumined by a single light suspended above the problem box. (See p. 24). This left the remainder of the room dark and thus helped conceal the experimenter.

Bob required 120 trials to learn the association. Of these, 93 trials or 77% were correct. Of the last 50 trials, 96% were successful. Betty was given 340 trials in the learning series. The work was not properly controlled for her until the last 120 of these trials. She formed the habit early of looking into the light boxes and seeing whether or not the wooden exit doors were closed. This difficulty was finally obviated by using coarse mesh wire for the doors. These could not be sensed until the animal practically touched them. Of Betty's last 50 trials on learning, only 79% were correct. These tests should have been continued longer. Jack was given 540 trials on learning. Of these, 428 trials or 79% were correct. Of the last 150 trials, 98% succeeded. Jill received 825 trials during the learning period. Of these, 631 trials or 76% were correct. Of the last 150 trials, 99% succeeded. (The experiment box had wire exit doors when Jack and Jill were tested.)

Although the nature of the learning process is not our specific problem, the differences in the total number of trials required for learning by Bob and the last two animals are so great as to invite comment. The conditions under which the records were obtained differ in the following points: (1) Jack and Jill were younger than Bob by at least a year. (2) Work was begun with them in July and with Bob in (the preceding) October. This brought him nearer the period of hibernation when his appetite would begin to fail. (3) Jack and Jill received more trials daily and also were tested for more days. Considering the fact that when the experiments ceased Jack and Jill were younger than the other two raccoons were when the latter started and yet had accomplished as much, I do not believe that age was an important factor in determining the reactions. However, the actual fact of an age difference remains. The second point should have little explanatory force, since the animals were always eager to work. As to the third point, one would expect this factor to work in a direction opposite to that which the results indicate. However, such was not true with the rats, and it may be that here also the lesser number of trials daily is more favorable to rapid learning. The fact of a possible difference of preference for light and dark remains to be considered. Of the first 50 trials, Bob made 56% correct. Of the first 45 trials, Jill made 22% correct. Jack made 48% successful responses out of the first 45 trials. Age differences, differences of brightness preference and differences in the number of daily trials are possible explanations for the varying lengths of the learning records. Innate (?) individual abilities must also be recognized. (Betty's results are not considered because of their unreliability at this point of the experiments.)

Summary.—The only comparative statement with reference to the learning periods of the different groups of animals that the facts warrant is this: The raccoons Jack and Jill and both dogs belong together in the class that learned most slowly. The second class with reference to speed of learning is composed of the rats. Bob is in a class by himself. He learned more rapidly than any of the other animals. Further comments upon this aspect of the learning process will be deferred to the section on children.

B. Maximal Intervals of Delay Attained. (a) Group differences as to maximal delay.—The only conditions of experimentation that varied from animal group to animal group were these: (1) Number of trials daily. Rats 2, 4, 5, 6, 7 and 9 (Set A) and rats 10, 11 ,14 and 17 (of Set B) were given 5 trials daily. Rats 12, 13, 15 and 16 (of Set B) received 10 trials. The two dogs were given 10 trials daily. Of the raccoons, Jack and Jill were each given 15 trials and Bob and Betty 10 trials daily. (2) The rats of Set B were tested with reward alone. As was mentioned above, the dogs and raccoons were very much discomfited by having to back out of the light boxes when a wrong choice had been made. This was even more true in our tests than in most discrimination work owing to the small size of the light boxes.

TABLE IV

	Rat	Maximal delay	Per cent of correct response
Set A	2	1 sec.	64
	4	1 sec.	52
	5	3rd stage	52
	6	did not learn association	
	7	3 secs.	56
	9	10 secs.	72
Set B	10	1 sec.	76
	11	1 sec.	64
	*12	1 sec.	72
	*13	4 secs.	88
	14	3 secs.	80
	*15	1 sec.	86
	*16	1 sec.	50
	17	1 sec.	37

Set A tested with reward.
Set B tested with reward and punishment.
Those rats that are marked with a * received 10 trials daily. All the others received 5.

Table IV gives the maximal delay attained by the rats. The percentages are computed on a basis of 25 trials. It will be seen from this that only four rats of the fourteen tested reached intervals greater than one second. The percentage of correct behavior for one of these (No. 7) was only 56. Rats Nos. 4, 11, 15, 16 and 17 were tested with a choice of two boxes as opposed to three. This was done only after the animals had more or less completely broken down in their reactions to one box. Tests with two boxes were never made on any subject, unless the animal lost the cue to one box. It was this box that was dropped from the series. The maximum delays made by the rats under these conditions were increased. Nos. 11, 15 and 16 each made 5 secs. at from 76 to 90%. This must mean that it is easier to use two cues than three. Further comments will be added below (see p. 39).

Of the dogs, Blackie made 10 secs. at 76% for 30 trials. She then lost the cue to one of the boxes and was unable to react successfully to that one. When tested with two boxes she finally made a delay of 5 mins. for 5 trials at 80%; 86% had been made at 3 mins. for 30 trials. Brownie was tested only with three boxes. She made a delay of 1 sec. for 50 trials at 90% and 2 secs. for 70 trials at 68%. Both dogs were tested for eight months. The results should be representative of what dogs can do under the present conditions.

Of the raccoons, Jack made 14 secs. at 70% for 30 trials. Tested with two boxes, he finally made 85% at 20 secs. for 40 trials. He was tested for eight and one-half months. Betty made 82% at 7 secs. for 50 trials. Tested with two boxes, she reached 10 secs. at 86% for 30 trials. She was tested for one year and three weeks. Jill was tested only with three boxes. She made 3 secs. for 45 trials at 93%. The tests extended over a period of seven months. Bob made 90% for 10 trials at 15 secs. Tested with two boxes, he reached a delay of 25 secs. for 20 trials at 90%. Bob was tested steadily for a year and five months.

For fear that some critic would urge that the animals could not have delayed longer than they did even though the light had been constantly present, control tests were made as follows: The animals were taken at the stage when they had just broken down at some (for them) long interval of delay and were held in the release for one minute with the light on. When they were released, the light was still left on. The results show that the animals made a very high percentage of correct behavior. Their failure to make correct long delayed reactions must have been due, then, to their inability to use some cue by which to guide their reactions after such an interval and not to mere restlessness caused by the long confinement.

Appendix A contains tables that show all the regular tests given to the raccoons Bob and Jill and to rats 4 and 16. The data are there given in the order in which they were obtained. They are typical of the results of all the animals.

There is so much individual variation within the three groups of animals whose results have just been given that any exact correlation between length of delay and groups of animals is unwise. It is to be borne in mind moreover that it is not the length of delay but the methods of reaction after delay to which the greater importance attaches. This topic will be discussed later. To give some further idea, however, as to the relation between the groups Table V gives the longest and the shortest delay made by each class of animals. This table ignores the different conditions under which the delays were obtained. It presents the maxima and minima of the best reactions that the individual animals of a group were able to make under the present conditions.

TABLE V

Subjects	Min. delay	Max. delay
Rats	Either no learning or 3rd stage	10 secs.
Dogs	2 secs.	5 mins.
Raccoons	3 secs.	25 secs.

(b) Effect of size of release upon interval of delay.—The experiments so far described were all made with the small release described in the section on apparatus. This release confined the animal's activities to a small part of the apparatus. It was thought if a release was used which would give the animal the freedom of the whole interior of the box, that not only might the maximal interval of delay be increased, but the animal might reveal more clearly its method of solving the problem,—indeed it might even develop a new and higher type of behavior in response to the more complex situation. These latter possibilities, we shall consider below.

The new release that was used fitted just inside the openings into the light boxes. It was made of a continuous piece of wire netting, thus making possible the simultaneous presentation of all three boxes. It was now possible for the animal to go over to the door of the lighted box and wait there during the interval of delay. The light was always left on until the animal had reached a position immediately in front of the lighted box.

Preliminary tests insured an absence of emotional disturbances in the reactions.

The animals tested under these conditions were: Rats 13, 15, 16 and 17 (No. 17 was the only one tested with a choice of three boxes); both dogs (Brownie alone was tested with a choice of three boxes); raccoons Jack, Jill and Bob (Jill alone was tested with three boxes).

Table 6 gives a comparative statement of the animals' abilities with large and small release. Both records for each animal are for discriminations with the same number of boxes. It will be seen from this that rat No. 13, the dog Blackie and the raccoons Jack and Bob are the only ones that failed to delay longer with the large release. This fact can be readily explained in the case of Jack and Blackie. The experimenter was primarily interested in discovering whether any new mode of behavior would appear under these conditions. When this question was answered, tests were discontinued with all the animals although in the case of Jack and Blackie the interval of delay was being steadily increased. The increase in delays made by the other animals is to be correlated with the changed conditions of experimentation. This point will be amplified when the detailed behavior of the animals is discussed.

TABLE VI

	Small release		Large release	
Animal	Delay	Per cent of correct reactions	Delay	Per cent of correct reactions
Rat No. 13	4 secs.	88	3 secs.	95
Rat No. 15	1 sec.	86	6 secs.	86
Rat No. 16	1 sec.	50	9 secs.	82
Rat No. 17	7 secs.	68	1 sec.	37
Blackie	5 mins.	80	1 min.	80
Brownie	2 secs.	68	6 secs.	96
Jill	3 secs.	93	7 secs.	80
Jack	20 secs.	85	15 secs.	88
Bob	25 secs.	90	20 secs.	76

(c) Effect of backgrounds of different brightnesses upon the interval of delay.—When the apparatus for the animals was constructed, every effort was made to secure qualitative similarity in the three light boxes. The backgrounds surrounding the entrances to the light boxes were all of the same brightness. During the course of the tests, the attempt was made to determine whether the animals *could* form an association between the lights and some constant marked differences in the external environment. In order to test this, three backgrounds of widely differing degrees of brightness were used as described above in the section on method. The animals tested under these conditions were: Rats Nos. 2, 4, 5 and 7 of Set A and Nos. 10, 12 and 16 of Set B; the dog Brownie; and the raccoon Jill.

The results of this test were entirely negative. No case was found where the animal made use of the different backgrounds as cues for guiding its reactions. One or two of the animals increased their interval of delay under the new conditions. However, when the old conditions of similar backgrounds were replaced, the long intervals of delay still continued. This indicated that the improvement was due to practice.

(d) Effect of number of boxes upon delay.—As stated above in section (a), whenever an animal's reactions broke down upon a particular box, that box was dropped from the tests and the discrimination confined to the other two. The following animals were tested under these changed conditions: Rats 4, 11, 15 and 16; the dog Blackie; and the raccoons Jack, Bob and Betty. The results are given for convenience above under section (a). Here it may be noted that all the animals delayed longer with two than with three boxes. This can be readily explained on the basis of the complexity of the problem. The maximum delay for any animal is decided by the accuracy of its response. With two boxes, this accuracy was increased and hence the maximum delay recorded was greater.

(e) Effect of other conditions upon delay.—The results do not indicate certainly any effect of punishment or of the number of trials upon the length of the interval of delay.

The results of this section indicate that the following factors influence the maximal amount of delay: (1) Different groups of animals; (2) size of release, and (3) the number of light boxes used. The following factors do not influence the amounts of delay: (1) Punishment and reward; (2) number of trials daily, and (3) backgrounds of different brightnesses.

C. Methods of Reaction After Delay Used by the Animals.—There are three different methods of delay which might have appeared and in point of fact did appear in our delayed reaction experiments: (1) The animal may maintain an orientation of all or part of its body during the interval of delay, i.e., it may keep its head or even its whole body pointing toward a certain box. (2) There would be the negative side of this, where the experimenter could detect no orientation cues used by the animal. In this case, no observable part of the animal's body would remain in a constant position. (3) The animals might rely upon position in the box for their cues, i.e., they might actually go nearer to one box than to the others and then wait to be released. (4) Any combination of these three methods might occur. The discussion of methods 1 and 2 (orientation and non-orientation cues) will be combined and will be followed by a consideration of method 3. The actual existence of method 4 will be considered as occasion demands.

(a) Orientation of whole or part of body.—In addition to what was given above in the section on method concerning orientation, it will be well to make such additional comment here as will indicate clearly the nature of the data secured. Great pains were taken to insure accuracy and consistency in the recording of orientations. Needless to say in such prolonged tests as the present ones, the experimenter soon becomes expert in deciding whether an animal's movements are to be interpreted as a change in orientation. Before an animal has been tested long, the experimenter can pick out a certain range of movement and call this the orientation toward a certain box. The animal (dogs excepted) was in constant motion, but so long as its activity was directed toward any one face of the release box, the orientation was recorded as unchanged. There would seem to be some chance for doubtful cases when the animal was pointed halfway between any two boxes. These cases were never counted as changes in orientation. Record was kept not only of the body position, but of whether *any* observable part of the animal remained in a constant position during the delay. Further note was taken of the gross amount of the loss of orientation—i.e., whether the animal turned clear around or not; and if not, then how far around—and of just which reactions were preceded by apparently identical orientations. The data were recorded quickly and easily by the use of symbols.

Every rat at the moment of release, went in the direction of his bodily orientation in 99 cases out of 100. (At times this was not true because of position habits formed by the animal.) (For the present purposes, it makes no difference whether the reaction was correct or not.) The data supporting this statement are so overwhelming that they need not be given here in detail. The rat, when put into the release box during the delayed reactions, oriented *immediately* to the light with its entire body and began a series of attacks on that side of the box in an effort to get out. This attempt was kept up until the animal was released, whereupon it went to the box that was straight in front. Experiment served only to lengthen the period during which they would attack any one side of the box. These statements hold true for all rats.

Both dogs were dependent upon orientation for the guidance of their successful reactions. They only differed from one another in the length of time during which they could maintain a certain orientation. The dogs differed from the rats in that the determining cue was the direction of the *head* rather than of the *body*. For the sake of concrete material illustrative of this type of reaction, I shall give a summary of typical reactions made by Blackie. Of 770 trials, given during a period of two months, on delays less than 3 secs. long, 141 were unsuccessful. On 116 of the 141, the dog had the wrong orientation at the moment of release and followed it. On the remaining 25 reactions, the dog failed to follow its orientation and was wrong. On 8 trials the dog had the wrong orientation at the moment of release, i.e., was not headed toward the proper box, and yet reacted correctly. However, only 3 of these trials were with a 2 secs. delay and may have been due to chance. The remaining 5 trials were at the second stage of delay where the light was on until the animal was halfway to it. Obviously, these 5 reactions signify no great ability. These results indicate that just to the extent that the dog was able to hold the proper orientation during the delay, just to that extent it was capable of reacting correctly.

Let us take another typical set of results from the same dog obtained on delays from 15 secs. to 5 mins. extending over 30 days. Two hundred and eighty-five trials in all were given of which 37 were incorrect. In all 37 trials, the dog had the wrong orientation and followed it. Only once did she have the wrong orientation and react correctly. When Blackie entered the release box, she would turn clear around and then, before the final breakdown came, would lay down facing the light. Occasionally she would be distracted by some accidental noise inside or outside the laboratory. In the great majority of these cases, she only turned her head. A few times she got up and turned clear around. But in any event, if she did not recover the proper orientation, the reaction failed. If she could have lost the orientation either completely, or almost so, and then have returned to it and have reacted correctly, the fact would have been strong evidence for believing that the dog recognized the proper orientation when it was reinstated. But taking the last 125 trials as typical, and classifying the instances where orientation was lost, recovered and a correct reaction made, it is found that 33 times the orientation was changed but slightly and three times completely changed.—By a slight change is meant that the dog turned her head and not her body. By a complete change is meant that the animal turned completely around.—Of the three cases of this latter behavior, one was very probably due to chance. The other two occurred on the second day of the 5 min. delays when the final breakdown was beginning. Moreover, the orientation that was lost and recovered,—in one case at the end of 36 secs.; in the other at the end of 4½ mins.,—was the orientation toward the box at the right. The reaction is thus not significant of some higher process, for on the following day the box at the right was the only one to which the animal responded. The recovered orientation, therefore, most probably indicates solely the growth of the habit that, on the following day, resulted in the complete disintegration of the reaction.

It is interesting in this connection to trace the change that occurred in Blackie's behavior from the beginning to the end of the experiments. It has already been noted how "helpless" and inactive both dogs were when the tests were started. After the work had progressed for several weeks and Blackie had become quiet and attentive, she would stand in the release box on all four feet and occasionally paw the wire in the direction of the light. A little later, she sat on her haunches during the retention in the release, but still clawed at the wire in a very calm manner. Toward the last of the tests described above, when the delays were growing rapidly longer, she lay flat down on the floor with her head pointed, usually, toward the light. But she did not lie quietly. The long delay seemed very trying. Blackie would whine, wiggle her body and pat the floor with her fore paws in a fever of impatience,—yet never change the alignment of her body. Many times the dog held her orientation almost until the last second of delay and then if, when the release came, her head was (apparently) not more than half an inch to the right of its earlier position, she went in that direction and consequently went to the wrong box. Surely this is weighty evidence against the functional presence of any higher processes. Everything points to the conclusion that Blackie's reactions were determined by the orientation of her head at the moment of release.

It has just been indicated that the maintenance of an orientation either of all or a part of the body was necessary in the case of the rats and dogs, if their reactions were to succeed. Such was not the case with the raccoons. Each of these animals could react successfully when the wrong orientation was held at the moment of release and when, so far as the experimenter could detect, no part of the animal's body remained constant during the interval of delay. The evidence in support of this generalization is perfectly conclusive. It is only possible—and necessary—to present typical cases here. I use Jack as an illustration, although he did not delay as long as Bob.

In Jack's first 800 trials of delays, 77 were wrong. In 7 of these 77, the raccoon had the wrong bodily orientation, but did not follow it. On 12 trials, he had the right orientation, but did not follow it. On 58 trials, he had the wrong orientation and followed it. Of the 723 correct reactions, 167 were made starting with wrong orientations.

In the following 1066 trials, 149 reactions were incorrect. This group of trials extends from a period of 8 sec. delays at which 75% was made through a series at 11 secs. where 91% was made. Forty-one errors were made when the wrong orientation was held but was not followed. Thirty-seven were made when the right orientation was held. Seventy-one were made when the wrong orientation was held and followed. Out of the 917 correct trials, Jack reacted 309 times correctly when his orientation was wrong.

It is interesting to note that almost one-fourth of the last mentioned errors were made despite the fact that the proper orientation was being held. This is a type of reaction that almost never occurred with the rats and the dogs. It would seem to indicate that this raccoon is less dependent on gross motor attitudes than the other animals. But the most significant behavior is that of reacting correctly when the wrong orientation was held at the moment of release. From the first set of figures above, it will be seen that of 232 trials when the wrong orientation was held, 167 or 71% were correct. The second set of figures shows that of 421 trials when the wrong orientation was held, 309 or 73% were successfully carried out. Such a high percentage places the results above the possibility of explanation by chance. Again, the fact that this type of behavior dominated for several days at a time indicates that something more than chance was manifesting itself. At 8 secs. delay, e.g., Jack made 10 correct reactions in one day, starting with wrong orientations. The following two days had 7 each; and the following two, 4 each. The next day the delay was increased to 9 secs. and 8 correct reactions with wrong orientations were made. Eight, 6, 4, 8 and 6 were the records of such reactions for the following days. The next day after these, 10 secs. delay was given. Here 9 correct reactions were made starting with wrong orientations. These are fair samples of the prevalence of this type of reaction.

In order to emphasize further the fact that Jack did not need to keep *any* observable part of his body in a constant position in order to react correctly, I shall give one day's record in detail (Table X). Often only the raccoon's hind feet—or one of them—remained constant. The interval of delay in this illustration is 10 secs. N.c. means no part of the body kept constant. H.f.c. means hind-feet constant. Rt.h.f.c. means right hind-foot constant. If the letter designating the orientation held at the moment of release is in italics, the animal oscillated between two faces of the release. If in addition the letter is starred, the animal oscillated from one to another of all three faces of the release. On the 3rd and 5th trials, Jack was distracted by some noise during the delay. A concrete statement of what these symbols mean in one or more instances should make the record perfectly clear. On the first trial, the light was turned on in the right-hand box. It was turned off and the animal held for 10 secs. During this delay, Jack turned toward all three boxes. No observable part of his body remained constant. At the instant of release, he was headed toward the proper box, a, and reacted correctly. On the 5th trial, Jack was oriented toward the middle box, *b*, at the moment of release. He went to *a*, then to *b*, then to *c* and back to the experimenter for food. The reaction had failed. If to the large number of correct trials made with wrong orientations be added the correct trials made with correct orientations that had been completely lost and then refound, the number of reactions significantly different from those of the rats and the dogs reaches relatively huge proportions.

TABLE X

Raccoon	Orient. when released	Light box	Behavior	
Jack	*_a_	a	a	n.c.
	*_a_	a	a	h.f.c.
	*_a_	a	a	h.f.c.
	*_a_	b	b	rt.h.f.c.
	*_b_	c	abc	n.c.
	*_b_	c	c	rt.h.f.c.
	_c_	b	b	n.c.
	*_c_	a	a	n.c.
	_b_	c	c	h.f.c.
	*_a_	c	c	n.c.
	_b_	c	c	h.f.c.
	_a_	b	b	rt.h.f.c.
	*_b_	a	a	h.f.c.
	_b_	b	b	n.c.
	*_a_	b	ab	rt.h.f.c.

Two other types of reaction remain to be indicated in the above table, (X). Orientation b was held 6 times; orientation a, 7 times, and c, twice. Yet different correct reactions followed from the same orientations. Jack was oriented to c once and went to b correctly. The next trial he had the same orientation and went to a correctly. In neither case had he seemed to keep any part of his body constant. In the 4 correct responses to the light box b, the corresponding orientations were as different as possible. Twice Jack was oriented to a and once each to b and c, yet each time the correct reaction was made. In other words, the *same orientation* did lead to *different reactions* and *different orientations* to the *same reaction*. These, again, are types of behavior never met with in the rats and dogs. This behavior occurred so frequently with Jack and with Bob—

less frequently, however, with Jill and Betty—that it must be described as a genuinely new type of reaction in these experiments and not as the result of chance or of the foreknowledge of what box was to be presented. (This latter possibility was adequately ruled out by controls.)

Table XI gives a numerical statement of the importance of orientation for the rats, dogs and raccoons. As far as this factor is concerned, the animals within each class were on a par with one another. For this reason, I give the results for typical subjects and not an average for all members of a group. The data given for each animal are calculated from comparable groups of 800 delayed reactions each.

TABLE XI

	Rat No. 14	Dog Blackie	Raccoon Jack
No. of reactions in accordance with orientation..	698 trials or 87%	760 trials or 95%	614 trials or 76%
No. of reactions not in accordance with orientation..................................	102 trials[43] or 13%	40 trials or 5%	186 trials or 24%
No. of reactions not in accordance with orientation that succeeded......................	15 trials or 14%	5 trials or 12%	167 trials or 89%

This table indicates plainly the similarity of the behavior of the dogs and rats as well as the wide divergence of the raccoons from the other two groups of animals. The rats and dogs almost never reacted in opposition to orientation. When they did do so, the number of their successes was a negligible quantity. That orientation was a strong factor with the raccoons is evidenced by the 76% of reactions that followed it. This fact makes the 89% of correct reactions starting from wrong orientations of great significance. The reactions succeeded in opposition to strong orientation influence. This statement is supported by the facts above noted. It was shown there that one of the raccoons (a typical one): (1) Made different correct reactions from the same orientation, and (2) made the same correct response from different orientations. Additional evidence will be presented later when the effect of the size of the release upon the methods of delay is considered.

---

[43] The large percentage of reactions not in accordance with orientation made by the rat, when compared with those made by the dog, is due to the acquisition of a habit of holding orientation b and reacting to box a, i.e., to a position habit.

One other line of evidence which points to the uniqueness of the raccoon's behavior should be noticed here, viz., the growth of the methods of delay during the course of the experimentation. Did the rats and dogs rely upon orientation from the beginning of the tests? Was the non-orientation cue natural with the raccoons or acquired under the stress of circumstances? An examination of the records reveals the fact that from the beginning of the learning tests the rats and dogs reacted in accordance with orientation. There was no development of a new method as the delays were increased in length. There was simply an improvement in the facility with which the animal maintained its position for a given length of time. When the orientation was lost, it was no easier to react correctly at the last of the experimentation than at its beginning. In the case of the raccoons also there was no initiation of a new mode of response. There were, on the average, as many reactions per day during the learning period that did not follow the orientation as there were per day during the delayed reactions. The improvement that took place as the experimentation proceeded was in the accuracy of responses not in accordance with orientation, when these responses were made after a long delay. "Non-orientation reactions," therefore, seem to be *natural* with raccoons and thus seem to differentiate their behavior from that of the rats and dogs.

(b) Position in the box.—The data considered under the above title are those indicating the effect that the large release box had upon the methods of delay used by the various animals. It will be remembered that the large release gave the animals the freedom of the interior of the box and thus permitted them to take up a certain position in the box as well as to maintain a certain bodily orientation.

Four rats, both dogs and all of the raccoons save Betty were tested with this large release. Only three animals had their methods of behavior essentially modified: Rats 17 and 16 and the raccoon Jack. In no case, however, did an animal that had depended upon orientation for its cue begin the use of a non-orientation factor. What the modifications were will come out in the following descriptive summary.

An analysis of the behavior of the four rats when tested with the large release, brings to light the following facts: Save in four cases, No. 17 went in the direction in which his body was pointed at the moment of release. *This was true regardless of his position in the box.* Nos. 13 and 15 always went in the direction of body orientation. Hence position was only effective as an aid to the retention of body orientation. During the last week of the tests with this large release, No. 17 manifested an exceedingly interesting type of behavior. He needed to keep *neither position nor orientation constant in order to react correctly.* I could find no observable body cue by which the problem was solved. The first day of this particular week, 3 of the 10 trials were of this type, but for several days no more instances were noted Then they were again in evidence until the end of the work. The *correct* reactions made in this manner never exceeded 3 per day. That I was much astonished at the sudden appearance of this type of behavior in the rat goes without saying. To think that at the end of eight months' steady work, the animal should suddenly adopt a new mode of behavior! It was not many days, however, before the accumulated data made clear the explanation. *The rat always turned to its right and entered the first box that was encountered.* Thus the animal could be at the middle box, but with its nose slightly to the right of the door to this box, and when released it would whirl and go to the box on the right. In the same manner, the rat might have its nose just to the right of the door to the left box when the release was raised and turn and enter the middle box. The behavior of rat No. 16 differed from this only in the direction of turning. This rat always turned to the left and entered the first box that it came to. From these data, it is obvious that the animals were using motor cues to guide their reactions. Their behavior was practically, if not entirely, automatic.

There is no need to detail the results obtained with the dogs when the large release was used. Both animals always went up close to the release in front of the lighted box and then waited until released. Each followed the orientation of his head regardless of which box was nearest.

Among the raccoons, Jack's change of behavior was a shift from the use of a non-orientation cue to a position cue. The change occurred just at the close of the tests with the large release. His usual behavior as well as his new form may be set forth as follows: Before the new release was used, Jack was being tested with boxes *a* (the right one) and *c* (the left one) only. When the large release was put on, the tests were still confined to these two boxes. This was necessary in order that the results be strictly comparable. Of the 510 trials given under these conditions, 56 were made: (1) In which no observable part of the animal's body remained in a constant position; and (2) in which the animal's position in the box was wrong at the moment of release. In every one of these 56 trials, i.e., the animal was both in front of the wrong box and headed away from the right one when the instant of release arrived. Twenty-six of the 56 were reacted to correctly. Chance will account for this number of reactions as far as the mathematics of the problem are concerned. However, from the point of view of the observer, the majority of the reactions looked like anything but chance behavior. This was especially true when Jack reacted correctly and yet was pointed directly away from the proper box. There was a directness and sureness about his reactions that hardly savors of chance. I do not urge these instances on the reader as evidence of non-accidental reactions. I simply note the fact of their presence and the impression that they made upon me. It is well to remember in addition, though, that since orientation was such a strong factor in determining Jack's reactions (see above, Table XI) that any responses in opposition to this must be given great weight.

Owing to the fact that only two boxes were used in this series and that they were located far apart, the raccoon had every incentive to rely solely upon his position in the apparatus for the reaction cue. This he soon did to a large extent. In every case where his position was constant (and correct) and his orientation changed, he reacted successfully. In other words, position was the determining factor. When this became evident, the experiment was stopped. *The raccoon had shifted the basis of his response so that I could detect its nature by observation.* Jack's behavior at this point was thus on a par with the dogs and rats. Had the tests been continued, all that could have been expected was the perfection of a habit of staying near the proper box. This did not appeal to me as a profitable goal of endeavor.

For further confirmation of the statements made above concerning the general methods of delay, I shall present the raccoon Bob's record with the large release in some detail. Three hundred and sixty trials were given on two boxes with this release. Of the 27 reactions made with the *wrong position and correct orientation*, 19 were correct. Of the 91 reactions made with the *right position and wrong orientation*, 81 were correct. Sixty-three times the reactions were preceded by positions and orientations that were both wrong. There are two possibilities here: (1) Orientation and position may favor the same box; (2) they may favor different boxes. Forty of the 63 were reactions of class 1, i.e., were initiated by orientations and positions that favored the same wrong box. Fifteen of the 40 were successful. In other words, although both position and orientation favored the same wrong box, Bob was able to overcome the handicap and make 37% correct reactions. The remaining 23 reactions were of class 2. Of the 23, 16 were successful. Where position and orientation were both wrong, but did not combine to favor the same box, Bob made 69% correct reactions. Of the 7 reactions of class 2 that failed, 5 were in accordance with position and 2 in accordance with orientation, i.e., 5 times the animal went to the box favored by position and the remaining times to the one favored by orientation.

In order that the reader may have a perfectly concrete presentation of the reactions with the large release, I will quote a day's record from the diary. The reactions were made at 8 secs. delay and with the exit doors from the light boxes, *b* and *c*, open. In the records obtained with the large release, some new symbols were used in describing the data placed in the

TABLE XIV

EIGHT SECONDS DELAY WITH LARGE RELEASE

Animal	Orient.	Light box	Behavior	
Bob	b a–2	b	b	h.f.c.
	b	c	c	n.c.
	b	b	b	h.f.c. (walked to *a* and back)
	b c–2	b	b	n.c.
	c	c	c	
	b	c	bc	n.c.
	b	b	b	
	c b–¾	c	c	n.c.
	b	b	b	h.f.c.
	b	c	c	n.c.

"orientation" column. The first reaction, e.g., is to be read as follows: The light was turned on in *b*, the middle box. Bob was held for 8 secs. during which time he pivoted on his hind feet, swinging his body along in front of *b*. At the moment of release he was still in front of this box, but was oriented with his nose in the corner halfway to *a*, the box on the right. During the delay at the fourth reaction, no part of the raccoon's body was constant. He walked over in front of *a* and when released was in front of *b*, but his body was pointed to the corner half way to *c* at the moment of release. At the instant of release for the eighth reaction, Bob's body was pointed three-fourths of the way toward *c*. This brought his nose within a few inches of the entrance to that box, yet the reaction succeeded. In the tenth trial, as in the second, position and orientation both favored the same wrong box. In each case the reaction was correct.

The net result of the data presented here for Bob is an almost entirely conclusive proof of the statement that he does not wholly depend either upon bodily orientation or upon position in the box for the cues determinant of the subsequent reaction. The 37% made with the reactions of class 1 is very significant when one does not lose sight of the fact that both orientation and position were here *combined against* any other factor leading to a correct response. In class 2 where such a combination was not present, the percentage is conclusive as to the presence of some non-observable cue. This is but further data confirmative of that already presented above for Jack with the small and large release.

In view of the generally negative results obtained with the large release, as far as developing new and higher types of behavior is concerned, some one may say: (1) That if all of the animals had been started with the large release instead of with the small one, they would not have been so likely to develop gross motor cues to guide their reactions, and (2) that it is not surprising that no new type of behavior appeared after the animals were firmly in the grip of habits developed in the small release. To these criticisms I can only reply that any experiment must exhaust first one method and then another. Time did not permit the use of both methods here.

2. Tests with Children

A. Method of Experimentation.—Details of the method of experimentation here used may be presented as follows: When the subject was first brought into the room, the following instructions were given: We have a little game in here which we are going to play. You will stand in here, (I indicate the release box). When I release you by raising the gate, (I illustrate raising the gate), you are to go and push one of the buttons over on the wall. One of these buttons will make a noise. If, after I raise the gate, you *push the noisy button first,* I will give you some candy when you come back to me. But if you go first to some button that isn't noisy, then you must try again before you get the candy. So, you see, the game is to *push the noisy button first* and so get candy. Do you see now how we are to play the game? Run over there and push on some of the buttons. See, sometimes they make a noise and sometimes they don't. (I switch the buzzer on and off for all the buttons. The lights are not on yet, nor has the subject's attention been called to them.) Now let's try the game and see if you can *push the noisy button first.* (The child is placed in the release box. The light is switched on over the noisy button. The child is held 5 secs. in the release box before being set free.) These instructions were memorized by the experimenter; and, although parts were repeated several times to the subject, nothing that is not given above was told to the child.

It was found that with all save F, 6 preliminary trials were sufficient to familiarize the children with the apparatus and to overcome their timidity. (H's exception will be noted below.) F was given 35 trials extending over three days on the preliminary work of learning that the noisy button meant candy. By the end of that time the association was firmly established.

No fixed number of trials per day was given. The amount of the day's work was adjusted to the child's disposition and to the length of delays. No set number of trials was given at any stage of delays. In other words much the same method was used as for the first year's work with the raccoons, Bob and Betty. Delays were increased continuously until an error was made. At this point, they were either decreased at once or continued at their existent value for several trials before further change was made. The experimenter believes that so flexible a method, when properly checked by careful observation of the subject so that the task is changed in constant sympathy with the subject's apparent needs, is excellently fitted to bring out what the subject *can* do naturally as opposed to what it can be *trained* to do. Of course the effects of training cannot, and need not, be eliminated. However, they are not so great in the method outlined above as they would be were many trials given at each stage. The difficulty here is the same as that mentioned when discussing the records for the raccoons viz., where only a few trials are given, the critic has a better chance to claim that the results are due to chance. Our conclusions will seek to avoid this criticism. But in the last analysis, the themselves must be their own justification.

B. Are the Results Obtained from Animals and Children Comparable?—In the light of the foregoing method and of careful observation of the children, the following points suggest themselves as the essential considerations in a relative estimate of the conditions under which the children and the other animals worked: (1) Fear.—This was overcome in the animals by the preliminary training; in the children, by kindliness and cheerfulness on the part of the experimenter and by the child's examination of the apparatus as described above. (2). Motive.—Hunger and punishment insured a maximum of effort on the part of the animals. Candy, words of praise from the experimenter and a desire to excel its companions incited the child to do its best. (3) Knowledge of the reaction desired.—The rats, dogs and raccoons had to learn everything by themselves. (a) The preliminary series acquainted them with the fact that there were three exits to the problem box and possibly also with the fact that only one of these would be open at a time. (b) In the regular learning tests, these animals had to associate the light and the open box in such a manner that the light became the sign of the open box. (c) In the delayed reaction tests, again, they had to learn that the open exit was always in the box which had been most recently lighted. If we turn now to the children, we find the following situation: (a) They were told of the push buttons which for their problem corresponded to the exits of the other experiment boxes. Where the animals had had to learn the fact of only one open exit by trial and error, the children were at least aided by being told that only one button would make a noise. (b) In the regular learning series, the children had to acquire the association between noisy button and light on their own initiation. It must be remembered that the experimenter *never* mentioned the word light and never directed the subjects' attention to the lights as long as the experiments continued. (c) In the delayed reaction, also, the children were thrown on their own resources in the working out of the problem. (4) Treatment during the delay.—During the interval of delay the rats, dogs and raccoons were usually left strictly alone. Only in a few control tests was any effort made to distract them. However, uncontrollable noises occasionally intervened and disturbed the dogs and the raccoons. During the period of delay, the children were entertained by the experimenter by means of stories, the drawing of pictures and, in a few of the long delays, by gifts of candy. In his opinion, these distractions made the experiment more difficult, although it is true that impatience and fretting on the part of the subject were largely eliminated. It would thus seem that the only objection to this method is that possibly the distractions served to urge the child to form a "purpose to remember" sooner than would otherwise have been the case. I cannot deny this as a possibility. It may have occurred with the girl M. But from the fact that the others remained impatient and complained of the delay until late in the experimentation, I do not believe they realized before that time that the problem was to see how long they could remember. Questioning on this point at the close of the experimentation confirmed this. (5) Possibility of the problem being talked over by the subjects.—This, of course, has no bearing on the case of the animals, but it presents a fairly serious possibility with respect to the children. The possibility is all the greater because of the fact that four of the children lived in the same neighborhood. Although recognizing this, I feel that it played very little part in the experiments; for where it might have been effective, the tests continued but ten days. M was old enough to do as she was told, unless severe temptation came her way. Such a possibility, however, was prevented by cold weather and school keeping her away from the other children. As will be pointed out later, talking could not have influenced H's conduct because she knew all about the experiment. F was under the experimenter's control and never saw the other children. Hd and L differed so in their attitudes toward the problem and in their general behavior, that I cannot well believe they talked about the problem when together. Further evidence why it is improbable that the children planned with one another how to work the problem is that there was a very keen rivalry as to who should have the most candy beans at the end of the day's work. When the work was finally dropped, the children said that they had not talked the problem over with one another. In the light of these considerations, I believe that the children and the animals worked essentially on a par, so far as extra-individual influences are concerned, throughout both the regular learning series and the delayed reaction series. I say "essentially on a par" because the social influence due to the presence of another member of the same species was operative in the case of the children while it did not appear with the animals.

C. Learning.—A few words will suffice to describe the trials given on learning the association between the lights and the noisy button. With all subjects save F the light was first turned on at *a*. (For F it was put on at *b*.) On this first trial all the subjects failed. F went to *a*, then walked past *b* to *c* and thence back to *b* and rang the buzzer. All the others went first to *b* and then to *a*. This may have been due to the fact that *b* was the nearest of the buttons. F was the only one that made an error in this series after the first trial. The others learned the association in one trial. Out of the 16 trials on the first day, F failed on 9. The first test was missed the second day and none the third day. In other words, no errors were made after the 17th trial.

D. Differences Between the Learning of Animals and Children.—Some of the difference between the above data and that for the animals is undoubtedly due to differences in attitude toward the problem, although the conditions were so arranged that this should have been at a minimum. Five rats learned the association in from 160 to 176 trials. The two dogs, it will be recalled, required more than 500 trials. Bob received only 120 trials. These figures present the number of tests after which no errors were made. Over against these figures, 46 should, stand as the largest number of trials given on learning to any of the children, and this to F, the youngest.

I believe that the main factor that would make for non-comparability in these results is that of brightness preference. It is not known what the value of this factor was for the children. But leaving this possibility aside, it is to be noted that the above records fall into two well defined groups; those for the animals and those for the children. If the difference here is correlated with grades of intelligence,[44] one may well ask why no such differences appear between the several classes of animals. The problem is all the more interesting when it is pointed out that there seems no certain correlation between the ability to learn the association and the ability to delay when one considers the various groups of animals. The dogs and the rats used the same method in delay, yet Blackie delayed longer than any rat. Jack and Bob used methods of behavior in delay quite different from the other animals and their delays were far longer than those of the rats and of Brownie. Furthermore two of these raccoons delayed about the same period of time, yet varied greatly in their times for learning the association. Among the children, matters would seem to be different. They learned rapidly and in delays reached relatively long periods of time by what seemed the same method used by the raccoons. The following answers suggest themselves with reference to the question put just above: The present data indicate: (1) Either that the different grades of intelligence among the animals were not great enough to be registered in the learning rates although the grades between animals and children were sufficient to manifest themselves; or (2) that the association can be learned with a type of process that will not suffice for long delays where the orientation is not maintained. If this latter alternative be correct, it would seem that the children used the method required for the last mentioned type of delay in their learning period. The raccoons, on the other hand, used the same method in learning the association that the other animals did, but a different method when it came to delays. There may thus be a difference in intelligence due to varying abilities in the use of some one instrument of adjustment or due to varying abilities in the use of different instruments of adjustment. Blackie and the rats would illustrate the first case; the children and raccoons in comparison with the other animals would illustrate the second. So much for the possible meaning of the learning times of the different animals and children

---

[44] V. C. Hicks and H. A. Carr [45] find no such correlation of the number of trials taken in learning a *maze* and the grade of intelligence of the subjects. The time is not ripe for a statement of the type of learning present in maze problems when compared with the present test. However, the data presented by the above writers and by myself would indicate that the two problems do not involve the same means of solution, at least to the same extent.

[45] Hicks, V. C. and Carr, H. A. Human Reactions in a Maze. *Jour. of Animal Behavior*, 1912, vol. 2, p. 101.

E. Delayed Reactions.—M, age 8 years, was given 38 trials on delay. The first 2 only were at intervals less than 1 sec. The others ranged from 1 sec. to 28 mins. and extended over 7 days. Fifteen trials were on intervals of 10 mins. and over. Only two errors were made, one at 5 mins. and one at 20 mins. The latter was probably caused by ill-humor. Longer delays might doubtlessly have been secured had it been desired. The only attempt was as follows: On four days (not consecutive ones), M was asked which button she pushed last the day before. Three times she answered correctly.

M did not need to keep any part of her body constant during the delay. On the trials involving more than 10 mins. delay, she was sent out of the room and put with the other children. During the delays she conversed freely with the experimenter. Any "purpose to remember" that the subject formed was formed on her own initiative. Great care was taken—and I believe effectively so—to insure that no suggestions be secured from extraneous sources. As early as the 15th trial on delays M volunteered the information that she remembered where the light was in order to push the proper button. Several times she reacted correctly and then volunteered that she had *guessed* which button to push.

Several extra trials were given in which the problem was changed. The light was now placed successively over two different buttons, the last button being the noisy one. This problem brought out a type of reaction very often seen in the animals. M would start toward one box and then turn and go to another. In the regular series, hesitation occasionally occurred and M wavered between two boxes.

Hd, aged 6 years, was given 47 trials on delays. Only the first two were less than 1 sec. long. The others ranged from

1 sec. to 33 mins. Fourteen trials involved intervals of 10 mins. or over. A total of 15 trials was given with intervals of 4, 5 and 6 mins. in length. In the 47 trials, 10 errors were made. Two of these came in each of the delays of 4, 5 and 6 mins. One came at 11 mins.; 1 at 12 mins.; and 2 at 20 mins. Hd, therefore, had no trouble in remembering the solution of the problem until the intervals of delay reached 4 to 6 mins. Then the difficulties that arose were mastered and did not reappear until the periods 11 to 12 mins. and 20 mins. were reached.

Hd did not need to keep any part of his body constant during delay. He and the experimenter exchanged stories continually. This subject differed from M in the number of errors and in the greater frequency with which information was offered. The former I attribute to difference in ability; the latter, to natural garrulousness. The restraint during delay was a great source of annoyance to Hd. He complained a great deal because of it. My diary notes contain many such passages as the following: When light was turned off, he said: "Why hold me so long, I may forget which it is." The subject evidently realized that he was to remember where the light had been. Many times during the delay, Hd would stop conversing and say "O, I know which one it is" and would then point—not always correctly—to the button he had in mind. Instances of wavering and hesitations preceding acts of choice were noticed with this subject.

L, age 6 years, was given 41 trials on delay. Only one of these involved an interval less than 1 sec. long. The remainder were from 1 sec. to 25 mins. in length. Twenty-one trials were on delays from 4 to 9 mins. long. Nine were on delays over 10 mins. in length. Seven errors were made in the total 41 trials. All of these came in delays of 4 mins. or over. Two were at 4 mins. and one each at the following intervals: 5, 7, 8, 15, 17 and 25 mins. L, as Hd, found most difficulty in the period around 5 mins.

L did not find it necessary to keep either his body or the direction of his attention constant in order to solve the problem. He, too, conversed freely with the experimenter during delays. L would often watch for the light out of the corner of his eyes. After it appeared, he would apparently pay no further attention to the problem until released. L was less demonstrative than Hd and did not remark so often during the delays that he still knew the proper button. Like Hd, he was impatient during the short delays at the first and the long delays at the last of the experiments. At times he wavered and hesitated in his reactions, saying that he had forgotten or that he wasn't sure. (In such cases, of course, the experimenter gave no cue to the solution.)

Each of the three subjects whose records have been discussed formulated his own "purpose to remember." H was given trials under the same conditions as the others, save that she was told the purpose of the experiment. She was told that the light would be over the noisy button. When delays were begun, she was told to be sure and remember where the light had been.

H, age 6 years, received 15 trials on delays. Only the first two involved intervals less than 1 sec. in length. The others varied from 10 secs. to 35 mins. One error was made at 21 mins. At this trial, H walked half way to *b*, paused for 5 secs., wavered as though to go to *c*, but finally pushed *b*. She then returned to the release and was told to try again. Again she wavered at a point half way to *b*, but this time she went to *c*. The light had only been turned on the one time. I did not talk to H during the first 12 delays. She was always told before the light went out to be sure and remember, but this was all. In the subsequent trials, every effort was made to distract her during the periods of delay. The results obtained with H, when compared with those for Hd and L, indicate that it is an aid to the subject to have the "purpose to remember" expressly formulated for him.

F, age 2½ years, was given 507 trials on delay. Of these, 30 delays were less than 1 sec. long. The other 477 trials ranged from 1 sec. to 1 min. Of the 477, 143 were wrong. The following table (XV), gives the relative distribution of these errors. It does not give the delays in the order in which they were given to F. The table simply summarizes the number of trials and errors at each stage. An advance was never made from one stage to another until at least 80% correct reactions were made for at least 5 successive trials. The only interval that F did not finally master was 1 min. This is surprising when such a high percentage of correct reactions occurred at 50 secs. On each of the two days when F was tested for the 1 min. delays,

TABLE XV

Delay	No. of trs.	Errors	Delay	No. of trs.	Errors
1 sec.	23	4	15 secs.	65	19
2 secs.	4	0	20 "	40	8
3 "	5	0	25 "	22	5
5 "	38	10	30 "	22	11
6 "	9	0	35 "	18	2
7 "	35	9	40 "	23	10
8 "	3	0	50 "	19	2
10 "	85	37	1 min.	45	26
12 "	10	0			

the first one-third of the trials were at 50 secs. Reactions were perfect. The last two thirds of the day's work was at 1 min. and both times she fell below 50%. There were no known extraneous factors to cause this. The conditions were as near ideal as possible. The method adopted with F, after the first three days, was one of slow advance from stage to stage. At the higher delays, each day's work was begun—as just illustrated—with the longest interval that had been mastered. Some 5 trials were given here and only if the reactions were perfect was an advance made. I believe that entire dependence can be placed upon the results obtained. F was the only one of the children that did not reach a delay of at least 20 mins.

F was distracted continually. She needed to keep neither her attention nor any part of her body constant in order to react correctly on delays up through 50 secs. She often hesitated and wavered in making the choice of buttons. It is interesting to note in this connection that this wavering, hesitant behavior was only noted in the case of the raccoons and children. Every individual of these gave many examples of it. This is significant when it is borne in mind that these subjects used apparently the same method in solving the problem. If that statement is too broad, at least it may be said that they agreed in *not* using gross motor orientation exclusively as did the rats and dogs. This is not the very usual type of behavior described by Yerkes for the dancing mouse. He says: "I have at times seen a mouse run from one entrance to the other twenty times before making its choice; now and then it would start to enter one and, when half way in, draw back as if it had been shocked. Possibly merely touching the wires with its forepaws was responsible for this simulation of a reaction to the shock."[46] The above reaction, noted by Yerkes, and other similar cases in the literature are reactions to present stimuli. Where the mouse ran to the entrance of the box, but did not enter, the explanation undoubtedly lies in the inability of the stimulus to set off the proper reaction. As Yerkes suggests, the stopping of the animals half way to the box was probably due to the contact with the wires. The same general type of behavior described above for the raccoons and children occurred during certain periods of time with my own rats and the dogs. In every case, however, it was due to a habit of turning around when released. This habit was executed in the same fashion no matter which was the proper box to choose. As opposed to the tests where either present objective stimuli or habit are involved, the reactions of the children and raccoons were, *as far as could be determined*, perfectly spontaneous, i.e., determined by intra-organic conditions that varied for the different boxes. These cases belong in the same class as that of Miss Washburn's cat described above (p. 20).

F's father, a trained psychologist, informed me that the child was just reaching the stage where her memory for objects and events had begun to take on definite form. When brought in from a ride in the park or a visit to a friend, she could very seldom remember the details of the event, indeed not more than half the time could she remember the gross fact of having been somewhere. This occurred even with what were to F very interesting experiences. Sometimes, it is true, the difficulty lay with the lack of control of language; but this was not always the case. After her playmate had gone for some time, if F was asked who had been there, not only could she frequently not tell, but at times she was bewildered even by the suggestion that anyone had been to see her at all. On the other hand, some cases were noted where F remembered an event for several days. Phrases, also, that she had heard but once were often spontaneously repeated for the first time several days later. The present tests thus found the child in a very important stage of mental development. Definite memories, of the adult human kind, were still hanging in the balance with the chaos of the preceding period. As far as the lengths of delay go, F ranks approximately half way between the other children and the raccoons. As to apparent method of work she—and the other children too—is superior to the raccoons in that orientation played no discernible rôle in her reactions.

---

[46] Yerkes, R. M. The Dancing Mouse. 1907, New York, p. 130.

VI. THEORETICAL CONSIDERATIONS

1. The Cues Essential for Successful Delayed Reactions

After the above presentation of experimental results, there remains the important task of determining as nearly as possible just what cues the subjects used in their reactions. The following paragraphs of this section will set forth in detail the various possibilities of interpretation and indicate what seem to me to be their relative validities.

Let us first formulate in a general way the conditions that a reagent will have to meet in the solution of the present problem. He is confronted with three boxes which offer as many known possible points of egress. One of the boxes is lighted. In the course of a series of experiments, the reagent has learned to go through, or to the lighted box in order to reach food. In time the stimulus will set off the reaction practically automatically. Approximately at this period, I begin to turn off the light before the subject reaches the box. It is possible that for several stages of delay the box which has been lighted remains light for a short interval of time due to the presence of after-images in the subject's eyes. But as the delays increase in length, there will come a point at which the problem shifts from "go to the lighted box" to "go to the one of three dark boxes that was most recently lighted." If this shift comes before the 1 sec. delay, it will be less likely to involve relearning. If, e.g., the change comes at the second stage, the momentum of running will make it easier for the animal to continue into the dark box than to turn and seek another. With some rats, the results indicate that the change did come at this stage; for when the light was turned out, the animals stopped short and went into another box, even though that too was dark. With the other animals and the children, it was impossible to tell just when the shift came. The problem having once changed, however, the question now is how long after the boxes all become dark can the subject pick out the one which was lighted most recently. Our special problem concerns only the solution of this second problem. During the learning series, the light stimulus acquires the power of releasing muscular activity applied in a certain direction. Just what direction this shall be is determined by the spatial location of the light. A significant meaning here attaches to the objective stimulus, i.e., the light plus the definite location. (By the term meaning, I imply nothing more than the fact that a certain stimulus evokes a certain reaction under conditions that are not usually described as involving mere habitual or reflex activities.)

As soon as the problem shifts to a choice of one of three similar boxes, i.e., as soon as a stage is reached where the determining stimuli are absent at the moment of reaction, then it is necessary, I assume, if the reactions are to succeed, that the subject develop substitutes which shall take the place of those stimuli as carriers of the needed meanings. In other words, the substitutes must *fulfill the function* of the previous stimuli in arousing the three appropriate movements. The substitutes may secure this power either through association with the light during the learning series, or during the delayed reaction tests themselves through a process of trial and error. In view of the fact that delayed reactions did succeed under the present conditions, there can be no question as to the *existence* of the substitutes. Our next problem is that of determining their nature.

The substitutes or cues that determined the subject's reactions may theoretically have arisen either within or without the organism. We shall consider the latter first.

A. Substitutes Derived from the External Environment.—Under this heading, we shall consider two possibilities: (a) Were there three simultaneously present objective cues that may have served to *determine* the subject's reactions? and (b) were there three objective cues that varied from trial to trial with the position of the light which may have determined the reactions after the light was turned off? In any case there must be two or three cues each determining one of three reactions. We shall consider the possibilities in the above order.

(a) Simultaneously present objective cues.—Although every effort was made to secure uniformity in the visual appearance of the three light boxes, they differed at least in spatial position and in the nature of the part of the experimental room visible above the walls of the apparatus. In addition there were possibly olfactory differences in the boxes used by the animals due to the animal odor itself and (in the case of the rats and raccoons) to a food odor set up by the milk that was on the forefeet of these animals. Suppose now that these simultaneously present external factors be treated in their entirety for each box and be represented by the letters x, y and z. It *may* be assumed that the subjects learned to react not to the lights—a, b and c—alone, but to the complexes ax, by and cz. Then when the delays were begun, the reactions were made to x, y and z, either immediately or after a period of learning. Here we would have three cues governing as many reactions, and all three cues would be presented simultaneously at the moment of release whereupon the reaction would take place.

This hypothesis is not supported by the experimental facts. If the reactions during the delay were determined by these stimuli present at the moment of release, the animals should have learned to delay for almost any interval of time. It should be no more difficult to react to x, y and z, than to the lights, since the reactions during delays were just as "precipitate" and "headlong" as when the lights were present. Now it was demonstrated that all of the animals could react perfectly when held in the release 1 min. with the light on. Why then could they not delay a minute with the factors x, y and z which were also constantly present? Further, if the subjects succeeded in reacting to x, y and z for intervals of 5 or 6 secs., why should they be unable to reach 7 or 8 secs.? In other words, why, if they reached one stage of delay on this basis, should the subjects not go a little beyond and so up to a large delay? There is no answer to this, if one assumes, as we have done, that the cues are simultaneously present at the moment of response.

In the section on experimental results, tests were described where the entire sides of the problem box surrounding the entrances to the light boxes were covered with cardboards of widely separated grades of brightness. This device accentuated (from the experimenter's point of view) the constant differences between the hypothetical stimuli x, y and z, yet under these conditions neither rats, dogs nor raccoons showed improvement in their abilities to react. This series does not prove that no objective factors x, y and z were influential in initiating behavior; but, in conjunction with the immediately following theoretical discussion, it does make it very improbable that such factors should have exercised a determining influence on the reactions.

Let us grant for the moment that such objective factors were present, could they *alone* control successful reactions, i.e., could they be the *determining* factors in initiating correct delayed reactions? Since x, y and z are present *simultaneously* at every response, they *per se* cannot be the bases for differential responses. The subject must *select* one of the boxes. Hence the hypothesis would need to assume that the subjects are not reacting merely to x, but to x-where-the-light-has-just-been. Here we are forced face to face with the problem from which we started: What represents, or is a substitute for, the light? What is the element attaching *to* x that is equivalent to "where-the-light-has just-been"? There can be no question but that x, y and z in some form constituted a part of the general stimulus, for the subject must apprehend the different spatial locations of the boxes in order to react to them. The objection may be offered that this contention as to the effectiveness of these objective stimuli is inconclusive, inasmuch as the animals may have been reacting entirely in terms of kinaesthesis, i.e., had learned the fixed order in which the three boxes were presented. This possibility was adequately eliminated by control tests whose results are discussed on p. 67. The point to be established here is that x, y and z could not have been the crucial substitutes for the lights. These must have been factors which were not all simultaneously present, each in its entirety, at every response, i.e., they must have alternated from trial to trial, depending therefore on the position of the light. The question now is: Were there any such factors in the objective environment?

(b) Alternating objective cues.—Controls were instituted: (1) To prove that during the learning series the light (an alternating factor) was the determining cue for the reactions; and (2), to prove that in the absence of the light no other external factor took its place as a determinant of the reactions.

1. The reagents did not derive any cues from the experimenter. Screens were so arranged that the operator was never visible to the dogs. Control tests were also made under these conditions with the rats, raccoons and children. The constant beating of a metronome covered up any noises due to the ex-

perimenter's breathing that the subjects might have utilized. The dogs and raccoons did not rely upon the *manner* of being released. This was proved by having different persons operate the release. This control was not used with the rats. However, it is extremely improbable that these animals depended upon cues from such a source. Moreover had they or any of the reagents done so, their intervals of delay should have been almost indefinitely great. It must be borne in mind that any cues derived from the experimenter, in order to afford extra aid in the reactions, must be present at the moment of release. This would make it possible for the animal to avail itself of the cue after a delay of any length. If the cues were given by the experimenter only at the beginning of the delay, the problem confronting the animal would not differ from that of delaying with reference to the light.

2. The reagents did not depend upon any after-glow of the lights. When the lights were left on for one minute—a period much greater than was ever used in the experiments proper—and were then turned off, there was no appreciable after-glow of the carbon filament that the experimenter could detect. (In any event, such an afterglow would not persist long enough to influence the longer delays of the reagents.) Hence any continued brightness of the boxes (considered from the reagent's point of view) after the current was switched off must have been due to the reagent's after-images. The possibility of using these for cues will be considered below.

3. The reagents did not depend upon variations in the temperature of the boxes in making their reactions. After the lights had been turned on for one minute in any box, the temperature of that box was never raised more than a degree centigrade. Indeed only occasionally could any change of temperature be detected. The "headlong" manner in which the animals reacted to the boxes, together with the fact that they oriented toward the light immediately upon its appearance indicate that they were not governed in their reactions by the slight variations in temperature. Yoakum[47] found that rats could discriminate differences of 16° C., but even then their behavior was the result of long special training. His squirrels

---

[47] Yoakum, C. S. Some Experiments Upon the Behavior of Squirrels. *Jour. Comp. Neur. and Psych.*, 1909, vol. 19, p. 565.

—and probably the rats also, although he does not say—were hesitant about entering the boxes even with a difference of 25° C. These data make it exceedingly improbable that the animals in the present tests were influenced by temperature.

4. The animals did not derive cues from the doors at the exits of the light boxes. Numerous control tests were made in which all of the doors—and they were of large wire mesh, and hence hard to see—were open. Under these conditions, the animals reacted as though only one door had been open, as was usually the case.

B. Substitutes Derived from within the Subject's Body.—The discussion of these intraorganic substitutes will be divided into two parts: (1) What were the internal cues used by the various reagents?; and (2), how did these internal cues operate in order to guide behavior?

(a) The type of internal cue used.—1. Did the subject anticipate the order of presentation of the lights, i.e., were the cues to the reactions the individual responses of an habitual series? The evidence is perfectly unambiguous in support of the fact that the reagents did not rely upon the presentation order of the boxes in making their reactions. The order for each group of animals (not children) followed a series of 30 presentations so arranged that each box recurred an equal number of times. A new series was given whenever one box was eliminated from the experiments. Control tests in which the regular order of presentation was varied were introduced practically once every two weeks with all the animals. Controls were also made in which the lights were not used.

2. Did the reagents guide their reactions by after-images of the light? Although the existence of after-images in animals has not been demonstrated, we shall, for the sake of the argument, disregard this fact and admit of their possibility. In order to lead to correct reactions in our experiment, these after-images must appear in the proper direction for each response. Their directional position is a function of the orientation of the head and eyes, and as a consequence the hypothesis can not explain those correct reactions resulting from faulty orientations. After-images can possess a possible function only in conjunction with the maintenance of a constant orientation, and the hypothesis would need to assume that these overt motor attitudes are but

subsidiary phenomena serving as a means for the effective functioning of the after-image processes. But after-images can hardly persist long enough to account for the maximum periods of delay attained by this method of solution. Such delays varied from 10 secs. for the rats to 25 secs. for the raccoons and 5 mins. for one dog. All of the conditions of the test were distinctly unfavorable for any persistence of possible after-images. The light was weak in intensity (3 c.p.). Its average duration of exposure was approximately but 5 secs. Any approximation to steady fixation either during or subsequent to the exposure of the light was the exception. The animals as a rule were continually on the move, nosing and clawing at the face of the release box both during the exposure and the period of delay. Steadiness of fixation after the perception of the stimulus is a very essential condition for the development of after-images. Movements of the head or eyes tends not only to prevent their appearance but also to destroy them when present. The significance of these conditions is more apparent by recalling the fact that any extended duration of after-images is an exceedingly rare phenomenon in the normal perceptual activities of humans. Fixation is too short and changeable for their development. Since we are forced to argue from analogy with human conditions, one must also distinguish between the possible presence of such processes and the ability to perceive them. The mind tends in the interest of clear vision to overlook and neglect such processes as it does in the case of entoptic phenomena. With many people the ability to see after-images involves a previous knowledge of their existence and some degree of training and practice in their observation. In other words, after-images as persistent objects of consciousness are a product of the laboratory, and the assumption of their effective existence as guides to conduct in the normal perceptual activity of an animal is exceedingly questionable. After-images exhibit the phenomenon of intermittence. No high percentage of correctness of response could result from such a cue, as its presence at the moment of response would be a chance coincidence. The theory of after-images, moreover, is entirely unnecessary, as we have the possibility that these motor attitudes of orientation may themselves serve as a sufficient guide to conduct, and on this hypothesis the assumption of the effective presence of after-images is an explanatory luxury.

3. Motor attitudes of orientation as cues of response. The data of the preceding section conclusively prove that maintenance of orientation during delay was an essential condition for correct response with the rats and dogs, and that such motor attitudes exerted a strong influence upon the behavior of the raccoons. Either these attitudes serve as the substituted cues and control conduct directly, or they function indirectly as a means of support to some such cue as an after-image. The evidence unambiguously favors the first supposition. These orientation attitudes, like any sensory process, may be a stimulus to definite movements. This tendency of the animal to run in the direction of their orientation at the moment of release was natural and habitual. The tendency was present in full strength at the beginning of the experiment. The tests merely developed the maintenance of orientation for longer and longer periods. This fact indicates that the motor attitude functions directly upon subsequent conduct. If the attitudes were but a means of support to some other cue, one would expect that this relationship of means and end would need to be acquired gradually during the experiment. An alternative theory presents many theoretical and factual objections. Any such roundabout and forced type of explanation is entirely unnecessary when we know that motor attitudes are a natural guide to the direction of subsequent responses. The mechanism of such a cue may be entirely automatic and mechanical. It requires nothing more for its explanation than does any habit. A stimulus initiates a certain act whose completion is prevented by external means. This initial activity persists unchanged so far as its directional aspect is concerned until the raising of the release permits it to function in a normal and habitual manner.

4. Some unknown intra-organic cue non-observable by the experimenter. Our data prove conclusively that some such cue was utilized by the raccoons and the children. Our proof of this statement is based upon the method of exclusion and the nature of such a factor must necessarily be defined at present in negative terms. We have exhausted our ingenuity as to objective possibilities of explanation, and as a consequence

are forced to conclude in favor of an intra-organic factor. The possibility of a temporal series of habits was eliminated by control tests. Neither orientation nor any distinctive motor attitude could be detected in the children or in at least 25% of the responses of the raccoons. The after-image hypothesis is entirely inadequate when orientation is faulty. In those reactions of the raccoons resulting from wrong orientations, the percentage of correctness was so great as to eliminate the possibility of chance. The nature and mechanism of this factor will be discussed in subsequent sections.

5. The following table (XIII) summarizes the cues used by the different reagents. P.C. (possible cue) means that the reagents so listed may have used that cue at times. N.C. (necessary cue) means that the reagents so listed had to use that cue or fail in a significant number of their reactions. R stands for rats; D, for dogs; RA, for raccoons; and CH, for children. For convenience of reference a classification is made in this table of those reagents that may have guided their reaction by ideas. This phase of the table will not be clear until the final section on the Place of Ideas in the Grades of Animal Learning is read.

TABLE XIII

Cues Used by the Re-agents

External	Internal							
	After-image		Orient. At.		Non-orient. At.		Idea	
	P.C.	N.C.	P.C.	N.C.	P.C.	N.C.	P.C.	N.C.
Never a determining cue	R D RA CH		RA	R D	RA CH		RA CH	

(b) The mechanism by which internal cues guide behavior.—As already indicated the mechanism of orientation attitudes presents no difficulties. The light stimulus arouses the proper act. This inhibited act persists unchanged so far as its essentials are concerned during the delay. At the moment of release the animal runs in the direction of its orientation. This tendency of responding in conformity with orientation is natural and habitual with the animal. The whole process is explicable on the basis of habit. Maintenance of orientation is acquired gradually by the trial and error method as is any habit.

The case of the non-orientation cues presents more difficulty. During the preliminary learning tests there was established by the trial and error method an association between the lights and the three acts of securing food. Between the two terms of each of these three primary associations there was interpolated probably by the trial and error method an intermediary link. These three cues were associated with their respective lights on the one hand and their respective acts on the other. Each light will now awaken its corresponding cue and this cue will in turn initiate the act with which it has been associated. In order to insure correctness of response, the proper cue must be present at or immediately after the release. As the interval of delay between the light stimulus and the response is increased in length, we have three possibilities as to the behavior of the intermediary link or cue. (1) After being aroused by the light stimulus, the cue may persist, or be constantly maintained, during the interval of delay. All of the available evidence tends to disprove such a hypothesis. The raccoons were frequently distracted during the delays by various laboratory noises, such as the squealing of rats and the rattling of windows. Note was made of these occurrences and still correct responses were possible in spite of these distractions. The raccoons were exceedingly active during the delays, pawing and clawing and running all about the release box. I often distracted the animals by bending down over the release box and yelling at them at the top of my voice. A typical case occurred when Bob was making a delay of 15 secs.—with a very high percentage of correct responses. These distractions during delay lowered his percentage approximately eight points. His behavior indicated that this treatment actually diverted his "attention" from the problem at hand. The emotional character of such a disturbance makes the high percentage of correct behavior especially significant. I also continually distracted the children during the delays by engaging their attention with stories, drawing pictures, conversation, etc. In fact the attention and interest of the children were often engaged to the point of absorption by these devices with no effect upon the correctness of their reactions.

The constant maintenance of the cue under these conditions of distraction and length of delay is highly improbable. Speaking in conscious terms, it would require great concentration and mental ability even for a human adult to keep any cue constantly in "mind" during such conditions. (2) The cue might be some intrinsically intermittent process such as an after-image. Such substitutes, however, could not suffice to guide reactions under the conditions of the experiment. Their presence at the moment of release would be purely accidental and hence they can not account for the high percentage of correct responses obtained. (3) We are forced to adopt the third hypothesis that the cue disappears after being aroused by the light stimulus, and is rearoused in some manner at the moment of release. To explain the mechanism of this revival, we shall assume that all three of the intra-organic cues have become associated during the course of the experiment with some sensory factor connected with the releasing of the animal. Hence the release is a stimulus which tends to arouse all three intra-organic tendencies. This revival, however, must be selective and adaptive and this adaptiveness can be explained by two additional assumptions. The presence of each light stimulus at the beginning of delay excites its corresponding intra-organic factor, and this excitement subsides after the disappearance of the light. Although the release stimulus does *tend* to revive all three factors, yet it will arouse that one most *recently active*, viz., that excited by the light at the beginning of the delay. The assumption that the predisposition of a tendency to response depends upon its recency of functional activity is a recognized principle of human psychology.[49] With such a mechanism, it would seem that the problem of delay should present no serious difficulties. However, the time interval between tests, i.e., the differences between the recency of excitation of the three factors, is small in many cases. Learning to enter the box most recently *lighted* as opposed to the box most recently *entered* is also no easy problem to master.

As we have indicated, such a mechanism would apply only to the non-orientation cues used by the raccoons and children. The type of function here involved is *ideational* in character.

---

[49] Ladd and Woodworth. Elements of Physiological Psychology. New York, 1911, p. 285.

By applying the term "ideas" to these cues, I mean that they are similar to the memory idea of human experience so far as *function* and *mechanism* are concerned. They are the residual effects of sensory stimuli which are retained and which may be subsequently reexcited. The revival, moreover, is selective and adaptive to the solution of a definite problem, and when aroused, they function successfully as a necessary substitute for a definite component of the objective stimulus aspect of the problem. The question as to the *content nature* of these cues, i.e., their sensory or imaginal character, is reserved for the succeeding section.

2. The Place of Ideas in the Grades of Animal Learning

A survey of animal reactions from those of the protozoa to those of the higher vertebrates leads one to the conclusion that the simplest behavior, from a genetic point of view, is the adjustment of a certain movement to a certain object or situation. This adjustment may be either native or acquired. In the former case, it is instinct; in the latter, the result of individual learning. (As such, it does not seem to be present in the protozoa.) The remarks in what is to follow are directed solely to the latter case. In the literature this is referred to as the stage of learning by experience on a sensori-motor level. Over against this genetically simple learning, may be placed a more complex form of behavior which involves a representative function. This ideational or representative process arises out of a genetically prior sensori-motor level of behavior. The field of its functioning is limited, moreover, to the representation either of some aspect of the object (or sensory) side or of some part of the movement and its consequences. In other words, the representative process must stand for either the sensory or the motor aspect presented in the genetically lower level of behavior. According to the law of parsimony, the only conclusive evidence in favor of the existence of such a representative element is the case where successful adaptations occur when that part of the sensori-motor process assumed to be represented is known to be absent at the moment of response. If the object or movement to be represented is present, why assume a representative or ideational process? The adjustment can be explained in terms of sensory stimulus and response.

This is the defect in all of the arguments and experiments which we have examined in the historical section above. Ideas *may* have been present, but since all of the behavior *can* be interpreted in terms of stimulus and response, the arguments are inconclusive.

From this point of view, there are from the standpoint of function two classes of ideas:—ideas of objects or those representing the stimulus aspect of the situation, and ideas of movement or those representing some aspect of the movement or its sensory consequences. Theoretically, the problem of ideas can be attacked from either point of view. Many discussions and experiments do approach the topic exclusively from the movement side, but practically such a procedure involves almost insuperable difficulties. Washburn,[50] e.g., makes the number of ideas of movement possessed by an animal more or less of a rough index of that animal's place in the scale of intelligence. But the presence of such ideas is as yet an assumption of very uncertain validity. Furthermore, an experimental technique that would isolate and control the movement factor would be extremely difficult, if not impossible to devise. When, e.g., an animal is brought along a path in a maze to a point where two possible reactions are presented, both responses are for the moment inhibited. But the two movements need not be represented, they may be actually there, although in an incipient form only, i.e., the conflict may be between the motor impulses themselves and the conflict may be resolved on this level without the influence of any factor representative of the effects of the movements. I doubt whether experimental tech nique can ever control this movement factor. Quite the reverse is true with respect to controlling the presence of the object, i.e., of the determining stimulus. This latter may be given or withheld at the investigator's pleasure. It is the merit of the experiments here set forth to have followed such a procedure. In the present case, there seems to be no room for doubt that the object reacted to was the light. Now if a representative function were involved in the behavior of the reagents, as seems to have been the case with the raccoons and children, it must, in part at least, have been representative of the lighted box, because all else—including the three possibilities of movement—

---

[50] Washburn, M. F. Op. cit., pp. 279–284.

was constant from trial to trial, whereas a selective response must needs have an alternating cue.

In the light of the evidence in the present monograph, let us grant the presence, in certain reagents, of a process representative of objects. The question now arises, Must this process be imaginal or may it be sensory? We may treat the latter possibility in two ways: (1) There may be a sensation arising from the reagents body—kinaesthetic, e.g.,—that stands for a certain reaction. Or (2), the substitute may simply consist of a differential meaning attached to the perception of the particular light box. In this case, when the reagent apprehended the box, he would simply recognize it as the one in which the light had been most recently. This would be perceptual recognition as the term is understood in human psychology.

With either of the above explanations, it must be remembered, the question that we are now raising is one concerning the content of the representative factor. There is no doubt in my mind that the *function* is an ideational one. Even should some critic claim that all of the present behavior is but perceptual recognition, the fundamental difference between the behavior of the class containing the rats and dogs and that of the class containing the raccoons and children will still challenge explanation. If the behavior of both the above classes of reagents is to be termed perceptual recognition, then two orders of this must be admitted—one on a level with habit, the other on a level with ideas.

One class of facts suffices to disprove the possibility of accounting for the behavior of the raccoons and children on the basis of perceptual recognition. These reagents did not stop and search for the proper box. They started their reactions immediately upon being released. The raccoons Jack and Bob, e.g., might be headed *away* from the proper box at the moment of release and yet whirl around in the proper direction and react immediately. Bob, in particular, might go half way to the wrong box and then turn suddenly and react successfully. When the reagent does not follow his orientation, one would expect him usually to look toward at least two boxes before reacting, if the behavior were on the basis of perceptual recognition. It is these reactions of children and raccoons that were not in accordance with orientation and yet that were "headlong" and "precipitate" that lead me to regard perceptual recognition of the boxes as an inadequate explanation of the facts.

The objections just stated do not apply to the assumption that the representative process is an intra-organic sensation. A positive justification of an ideational function whose content is an internal sensation may now be elaborated. There is no doubt but that in human consciousness a sensation may carry a meaning that is woven into thought sequences. In reading, e.g., all of the actually discernible conscious content may be kinaesthetic sensations from the muscles of the throat or may be auditory sensations, if the reading be aloud. Whether one say that the sensation is the meaning or that sensation is there plus a meaning, the case for our purpose is unaltered. Each sensation and its meaning become incorporated in a train of thought. A slightly different situation is presented where it becomes necessary for the sensation to represent that which is not there and then stimulating the sense organs. The following illustration from Titchener is a case in point: "I had to carry across the room, from bookshelf to typewriter, four references—three volume numbers of a magazine, three dates, and four page numbers. The volumes and years I said aloud, and then consigned to the care of the preservative tendencies. Of the four page numbers, I held two by visual images, one by auditory, and one by kinaesthesis."[51] The case of the volumes and years and that of the page numbers remembered by means of kinaesthesis are significant. Each is an instance (so far as we can tell from the account) of memory without the revival of images. The sensory cues, present at the time when the data were written on the machine, elicited the proper material. It is a dangerous procedure to complete another investigator's introspections. I do not intend to do so here. I simply suggest the above as a possible supplement to Titchener's own brief statements. Whether it be right or wrong in his case, the experience in which a *single* sensory process represents an absent object is sufficiently frequent to give us the suggestion for which we are seeking. The suggestion may also be found elsewhere. That which has become known as "conscious attitude" in the literature of imageless thought is identical with the first phenomenon that we have had under discussion in this paragraph. So far as the attitude itself is concerned, it might well be designated *sensory thought* as may other experiences also, such as the reading aloud that was mentioned above. The memory cases also may go into the same category. The sensations, both in the memory instances and in those of the conscious attitudes, differ, if at all, only on their meaning side and not by the addition of any overt imagery. Already the reader may have surmised, and rightly, that the writer is introducing the theory that the representative function found in the raccoons and in the child, F, at least, who was most nearly comparable with them, is likewise *sensory thought* and essentially comparable with the cases above given.

---

[51] Titchener, E. B. Experimental Psychology of the Thought Processes. New York, 1909, p. 202.

Let us come to closer quarters with this theory. The proposed hypothesis is equivalent to making the so-called "imageless thought" genetically prior to "thoughts with images" and to placing the point of origin at least as low as the raccoon. As opposed to this, current discussion by advocates of imageless thinking would seem to assume the opposite, viz., that "thoughts with images" are prior.[52] It is to be noted that the assumption has no factual basis, but that it seems to be the result of prejudice or of temperamental leaning. My usage here takes for granted that imageless thought can be analyzed into either sensory or imaginal content which carries the meaning. It is the former case that I use as the type found as low as the raccoons. This thought is image*less*, though not sensationless, in the strict sense. In the light of this, I can see no intrinsic objection to the above theory, while the following points are in its favor: (1) The evidence in support of the possession of sensations by animals is absolutely convincing to any save one who denies all consciousness to animals. On the other hand, the evidence for images is very meager and unsatisfactory. Indeed, it is even more so that has been thought if, as I believe to be true, the present theory of *sensory thought* will account for all of the controlled behavior that has been used to support a theory of images where that behavior is not open to a stimulus and response explanation. (2) Raccoons and young children are capable of reactions that seem explicable only on the assumption of the functional efficiency of a representative factor. If sensations *can* function in this manner, the law of parsimony forbids the assumption of images. (3) That sensations can function in this manner is indicated by the illustrations from human psychology noted above. It is a different matter, I know, to say that the sensations of animals also may function in this manner. But in order to explain the behavior of the raccoons, it is necessary to assume either the presence of images or the presence of sensations that function in this manner. The law of parsimony favors the latter type of process because sensations are genetically earlier than images.

---

[52] Bühler is an illustration of this. Referred to by Jas. R. Angell, *Psych. Rev.*, vol. 18, p. 317.

Inasmuch as the rats and dogs, as well as the raccoons, used sensory processes in the solution of our problem, we are forced to recognize that sensations may be placed in two classes on the basis of function: (1) There are sensations that can initiate a correct reaction from at least three possible responses *only when they have not been displaced*, during the interval of delay, *by other sensations of the same modality.* Here would fall those sensory experiences of constant orientation possessed by the dogs and rats. (Those cases where these animals lost their orientation and then regained it were few enough to be rated as accidental.) (2) There are sensations that can initiate correct responses, under the above conditions, even though they have been displaced during the interval of delay by others of the same modality. Here would fall the sensory experiences of the raccoons and children. The evidence which indicates that no sensory process need be constantly maintained in order that these subjects may react correctly is unambiguous. It is this type of sensory process that I have denominated *sensory thought.*

On the basis of human *introspection*, there is another grade or kind of learning, viz., the stage of the functional efficiency of images or centrally aroused conscious processes. Why there should be both sensory and imaginal thought in human experience is very difficult to say. The most obvious suggestion would be that imaginal thought, since it is genetically later, could accomplish tasks which sensory thought could not. I shall hazard no guesses as to what such tasks might be. At the present stage of psychological theory, there seems to be no question but that the distinction of sensory and imaginal thought itself is valid. Future work must attempt the formulation of the functional differences between them.

The result of the above theoretical considerations is a classification of the grades of animal learning different from those hitherto advanced. Washburn,[53] e.g., has presented three classes: "First, there is the condition where, so far as we can see, the animal does not learn by individual experience. * * * In the next place, we have the grade where the animal learns by experience, without having the power to recall an image of its experience. * * * Finally, * * * we have the possibility of an image." I would modify this scheme by the insertion of a stage called *sensory thought* between the second and third stages. The table would then read: (1) The animal shows an absence of learning by experience. (2) The animal is able to profit by experience, but has no higher capacity than "trial and error" or the "stimulus and response" behavior would indicate. The rats and dogs of the present tests come here. (3) The animal can learn by the "trial and error" method. *Indeed, probably most of its reactions are on this basis*, being ruled by stimulus and response. But a new element now makes its appearance, viz., *sensory thought*, which is a representative function of strictly sensory content. The raccoons that I used are in this class. Of the children, F is the most likely to belong to this class. (4) The fourth grade reveals the presence both of "stimulus and response" behavior and of sensory thought, but added to these is the possibility of directing reactions by images. The older children of the present tests very probably belong here rather than in the third class.

VII. SUMMARY AND CONCLUSIONS

The following is a statement of the results and conclusions that have been reached as a result of the foregoing experiments and analyses:

1. The rats (one excepted), dogs, raccoons and children made successful reactions in situations where the customary determining stimulus was absent at the moment of response. The stimulus might appear in any one of three boxes. These boxes were qualitatively alike, but situated in different directions

---

[53] Op. cit., p. 276.

from the release box. At every trial, three possibilities of reaction confronted the subject. A selection had to be made and that box chosen in which the stimulus had appeared most recently.

2. The conditions under which the maximal delay was tested and the results obtained are indicated as follows:

(a) Different classes of subjects were used. Table XIV gives the maximum and minimum delays that were obtained from the different classes.

TABLE XIV

Subjects	Min. delay	Max. delay
Rats	either no learning or 3rd stage of delay	10 secs.
Dogs	2 secs.	5 mins.
Raccoons	3 secs.	25 secs.
Children	50 secs.	25 mins.

(b) Backgrounds of widely different grades of brightness did not affect the intervals of delay.

(c) The use of a large release which gave the animals the freedom of the interior of the box lengthened the intervals of delay in the case of some subjects.

(d) The use of two boxes as opposed to three lengthened the intervals of delay by increasing the accuracy of response.

(e) Neither punishment nor the particular number of trials per day appear to have affected the interval of delay.

3. An analysis of the possible cues that may have been used by the subjects in the solution of the present problem gave the following results: (a) Overt orienting attitudes were the probable cues for many reactions of the raccoons. These attitudes must be assumed as cues for the rats and dogs in order to explain their reactions. (b) Some intra-organic (non-orientation) factor not visible to the experimenter must be assumed in order to explain a significant number of the correct reactions of the raccoons and all of the successful reactions of the children. These cues fulfilled an ideational function. (c) All of the reagents were influenced by external stimuli that were constantly present from trial to trial, e.g., those given by the box itself. However, these could not be used as a basis for selective responses inasmuch as they were constant from trial to trial and hence could not furnish varying, or alternating, cues.

4. No animal that had used overt motor attitudes in solving the problem when the small release and similar backgrounds were used adopted another type of cue either when a large release or when backgrounds of different brightnesses were used.

5. The method used in the present tests for attacking the question of the functional presence of a representative factor in animal behavior is superior to that of imitation, use of tools and others that have been used in the past, because here it is possible to determine what stimulus controls the behavior. It is therefore possible to insure the absence of the stimulus at the moment of response.

6. The representative factor for which search has been instituted in this monograph stands primarily for "objects" and not movements. A technique that would make certain a control of the latter factor so as to insure its presence or absence at the will of the experimenter has not as yet been perfected.

7. From a consideration of the theoretical advantages to be derived from interpreting this representative factor as sensory rather than as imaginal, a decision was reached in favor of the former alternative for all reagents save possibly the older children, H, Hd, M and L. Illustrations were given from human consciousness where a sensation performed a memory function or served as a link in a train of thought. Such cases have been termed "conscious attitudes" or "imageless thought." This function, as considered in this paper, was designated *sensory thought.*

8. The theory was advanced that such a function as sensory thought represents the highest grade of behavior in raccoons and probably also in children of some two and one-half years of age. This theory is supported by the hardly-to-be-doubted presence of sensations in animal consciousness and by the assumption that these sensations can function as the illustrations indicate that such processes do in human behavior. Such a theory seems more in accordance with the law of parsimony than would a theory which made images perform the representative function found in the raccoons and the child F.

9. From this theory, it follows that subjects may be put into at least four classes on the basis of the highest type of learning present in their behavior: (a) Absence of learning; (b) trial and error; (c) sensory thought, and (d) imaginal thought.

VIII. APPENDIX

A. Detailed Records of Two Rats and Two Raccoons.—The data given in the following two tables are self-explanatory. They give the course of the delayed reaction tests as these were presented to the animals.

TABLE XV

RACCOONS

Bob

Delays	Trials	%
1st stage	10	100
2nd "	10	100
3rd "	179	67
Controls were not perfected until the last 100 trials. Of these 72% were correct. Of last 50 trials, 80% were correct.		
3 sec.	20	80
3rd stage	5	100
1 sec.	7	28
3rd stage	4	50
1 sec.	10	30
learning	17	52
3rd stage	50	88
1 sec.	11	72
3 "	50	56
1 "	80	70
2 "	50	78
3 "	20	90
4 "	62	69
5 "	56	82
8 "	20	55
5 "	40	75
7 "	10	100
8 "	189	55
last	48	79
10 "	25	76
12 "	29	68
15 "	30	73
5 "	1	100
5–15 "	10	50
15 "	10	60
20 "	18	44
2 "	3	33
20 "	10	20
2 "	3	33
5 "	9	55
10 "	13	46
5 "	4	50
7 "	10	33
A— 5 "	49	75
7 "	20	75
8 "	36	80
10 "	50	72
12 "	10	90
15 "	10	90
20 "	96	64
last	46	71

Jill

Delays	Trials	%
1st stage	15	100
2nd "	75	97
3rd "	75	97
1 sec.	150	77
3rd stage	150	92
1 sec.	150	84
2 "	75	50
1 "	30	40
3rd stage	120	87
1 sec.	155	83
2 "	105	86
3 "	45	57
2 "	105	79
3 "	75	56
Backgrounds were used now:		
2 sec.	90	58
1 "	45	71
3rd stage	150	97
1 sec.	75	93
2 "	105	96
3 "	90	66
2 "	45	55
1 "	45	71
3rd stage	60	96
1 sec.	45	97
2 "	60	98
(backgrounds off for	30	100)
3 sec.	45	93
4 "	45	62
Learning with light on 5 sec.	30	100
Learning with light on 1 min.	25	80
Wire release now, 10 trials daily:		
Learning	80	95
2 sec.	50	98
4 "	50	60
2 "	100	89
last	50	96
4 "	50	88
5 "	50	70
last	30	90
6 "	40	90
7 "	50	84
last	30	70
6 "	30	86
Small release again:		
6 sec.	30	56

TABLE XV—Continued

RACCOONS

	Bob		
	Delays	Trials	%
	Two boxes, a and c, from now on:		
	20 sec.	20	95
	25 "	20	90
	30 "	10	90
	35 "	70	64
	25 "	10	40
B—	15 "	10	60
	5 "	10	33
	Boxes a and b now used to break up position habit.		
	5 sec.	60	30
	3rd stage	10	40
	Learning	295	97
	2nd stage	240	86
	last	51	93
	1 sec.	51	94
	2 "	50	96
	3 "	51	60
	2 "	50	66
	1 "	10	40
	3rd stage	51	86
	Learning c alone	21	14
	Learning all three		
C—		120	80
	last	100	100
	Learning with light on 5 sec., boxes b and c	30	86
	last	20	100
	Learning with light on 1 min.	30	90
	Wire release, 3 boxes:		
	Learning	50	100
	2 sec.	50	48
	Two boxes, b and c:		
	2 sec.	50	94

Bob		
Delays	Trials	%
2nd stage	10	100
3rd "	50	100
1 sec.	30	100
2 "	40	97
3 "	20	100
4 "	50	80
5 "	100	85
6 "	50	88
7 "	100	83
8 "	100	70
7 "	100	81
8 "	110	89
9 "	80	81
10 "	50	86
11 "	80	73
10 "	50	66
Boxes b and c from now on:		
10 sec.	40	100
12 "	30	100
15 "	50	96
20 "	30	90
25 "	50	86
30 "	71	80
35 "	101	70 or less
4 "	30	96
5 "	30	100
8 "	10	100
15 "	20	55
8 "	50	86
12 "	90	84
20 "	80	70
first	50	76
(dropped)		

TABLE XVI

RATS

Rat No. 4			Rat No. 16		
Delays	Trials	%	Delays	Trials	%
1st stage	5	100	1st stage	50	96
2nd "	10	80	2nd "	100	98
3rd "	30	50	3rd "	110	83
2nd "	5	100		last 50	76
3rd "	15	40	2nd "	100	99
2nd "	75	70	3rd "	50	100
3rd "	50	60	1 sec.	40	50
2nd "	75	85	3rd stage	20	60
3rd "	25	92	2nd stage	100	99
1 sec.	30	60	3rd "	50	96
3rd stage	25	88	1 sec.	30	36
1 sec.	25	52	Different backgrounds now:		
Different backgrounds now:			3rd stage	20	30
3rd stage	25	60	2nd "	90	96
2nd "	60	80	3rd "	50	58
3rd "	50	80	2nd "	100	99
1 sec.	25	64	3rd "	50	48
1½ "	25	48	2nd "	70	100
1 sec.	35	68	3rd "	50	68
1½ "	50	62	Two boxes now, b and c.		
1 "	25	64	3rd stage	50	92
3rd stage	50	64	1 sec.	100	87
Old backgrounds now:			2 "	40	97
3rd stage	65	61	3 "	50	98
2nd "	75	94	5 "	50	90
3rd "	60	66	7 "	35	60
Two boxes now, a and c:			Series with wire release:		
3rd stage	25	100	Learning	80	80
1 sec.	20	75	2 sec.	70	78
	(dead)		3 "	50	88
			4 "	40	92
			5 "	80	78
			6 "	60	76
			7 "	50	90
			9 "	40	82
			10 "	30	50
				(dropped)	

B. Notes on Raccoons.—Davis[54] and Cole[55] have given an excellent description of the habits of raccoons in captivity. In the main my observations substantiate theirs. A few differences, however, may be noted. Davis lays particular stress upon one habit which his raccoons formed, viz., that of covering their excrement. As well known this is contrary to their behavior in the natural state. My four animals were confined in one cage, 10 x 10 x 14 feet, the floor of which was covered an inch or more deep in shavings. Yet in all the long months during which the animals lived there, they never formed the habit of covering their faeces. These were always voided along the walls of the cage, and not once have I found evidence of an attempt to cover them. Moreover both Mr. DeVry of the Lincoln Park Zoölogical Garden, Chicago, and Dr. Hornaday of the New York Zoölogical Garden give an unqualified "no" in answer to the following question: Will the tame raccoon bury or cover his excrement, if given the opportunity?

No trouble was found in adapting the animals to a rather monotonous diet of bread and milk, varied occasionally with raw meat. But the amount of the rations to be given was more difficult to determine. Throughout the spring, summer and into the winter, the raccoon will eat voraciously. But by the middle of January, unless strict precautions be taken, the animals will be so fat that they will refuse to work and will sleep almost continually. My animals were kept on a back porch which was not artificially heated, and which was but slightly, if any, warmer than out of doors. Whether they would have gone into a genuine state of hibernation had I not cut down their rations in the fall, I cannot say. However, in view particularly of Betty's behavior, I am inclined to think that this would have happened. From about the middle of January until late in April, my notebook indicates that Betty lacked a motive for working. Tests were made during this period in order: (1) To prevent forgetting of the problem, and (2) to give the animal food in order that it might not become too weak from a long fast. The cases of the three other raccoons are not so extreme as this one,—yet all become less eager for food during the last two months of the winter. Davis found that all of his raccoons hibernated during the first winter when they were kept out doors. But during the second winter when they were kept within doors, although unsupplied with artificial heat, they did not hibernate. How he regulated the food supply at this period, and whether the animals became sluggish, he does not state. Further observations should be put on record before the conclusion is reached that the raccoon will change so fundamental an instinct upon so slight a change of habitat. Both Mr. DeVry and Dr. Hornaday inform me that their raccoons do not hibernate in the winter, although the living quarters are no warmer than outdoors. In addition, Dr. Hornaday replies as follows in answer to the question of how to prevent hibernation: "By constant feeding. Bears and raccoons hibernate because they cannot find food in the deep snow. Our bears never hibernate because they are constantly fed." I, too, fed my animals regularly, although sparingly, in the fall, yet indications of a desire to hibernate were observed. The subject of hibernation is very poorly understood at the present time, even among the biologists proper.

---

[54] Davis, H. B. The Raccoon: A Study in Animal Intelligence. *Amer. Jour. Psych,* vol. 18, 1907.

[55] Cole, L. W. Observations of the Senses and Instincts of the Raccoon. *Jour. of Animal Behavior,* vol. 2, 1912.

Both of the authorities above quoted inform me that raccoons reach maturity at three years of age. I note this fact because Cole's statement that "The year-old raccoons apparently are not quite full grown"[56] may be as misleading to some as it was to me.

Two other observations may be noted in passing: (1) The raccoon appears to have a very acute vision. I have seen several individuals chase flies that were crawling upon the floor of the experimental room whose illumination was extremely low. (2) The price of keeping tame raccoons is eternal vigilance. In the spring when the "wanderlust" strikes them, they will gnaw wood and tear wire,—anything to escape. And the usual reward for attempting to catch a loose raccoon is a severe bite.

---

[56] Op. cit., p. 213.

[Reprinted from THE PSYCHOLOGICAL REVIEW, Vol. XX., No. 4, July, 1913.]

BEHAVIOR AS A CATEGORY OF PSYCHOLOGY[1]

BY JAMES R. ANGELL

University of Chicago

Two years ago at the meeting of this Association we attended the obsequies of the term 'soul' as a member of the vocabulary of psychology. At that time some of our philosophical colleagues put in a plea for leniency, but the psychologists for the most part were agreed that for their purposes the term had outlived its usefulness. It should be noted that this verdict was not so much legislative as historical. It did not attempt to forestall the actual march of events. It simply recorded the demise of the term as already *fait accompli*. Nor was the verdict concerned merely with a question of terminology. It marked the passing of the problem with which the term was concerned. Religious and metaphysical thought will no doubt continue their interest in the soul, but for psychology in its technical aspects, the chapter is apparently closed.

The term 'consciousness' appears to be the next victim marked for slaughter and as one of the claimants for its fading honors we meet the term 'behavior.'[2]

---

[1] A paper delivered before the American Psychological Association at its annual meeting held at Cleveland, Ohio, December 31, 1912.

[2] In a paper presented to the Minneapolis meeting of the American Psychological Association in 1910 I said: "But it is quite within the range of possibility, in my judgment, to see consciousness as a term fall into as marked disuse for everyday purposes in psychology as has the term soul. This will not mean the disappearance of the phenomena we call conscious, but simply the shift of psychological interest toward those phases of them for which some term like behavior affords a more useful clue.' Cf. the suggestive paper by Professor E. P. Frost 'Can Biology and Physiology Dispense with Consciousness?' PSY. REV., Vol. XIX., p. 246.

Consciousness has been attacked from two directions. Our philosophical friends have been for a long time pointing out the spurious character of its claim to an unique place in the universe and, inverting the Berkelian position, not a few of them have reduced consciousness to one among the many relations sustained to one another by physical objects. Others less drastic have contented themselves by exhibiting the ambiguities and anomalies contained in the conception. The difference between feeling and awareness, the distinction between consciousness and self-consciousness, the contrast of immediate with reflective consciousness, these and a dozen other differentiations have been exploited as the generators of confusion and error. As might be anticipated, the cures proposed for these ills are various, agreeing only in the one point that we are urged to adopt the usage proposed by the author whom we chance at the moment to be reading. Attacks of this character are essentially frontal in nature. There is in progress, however, a wide flanking movement of another sort.

The comparative psychologists have from the first been vexed by the difficulty of ascribing to animals conscious processes of any specific kind in connection with intelligent behavior. Animals give unequivocal evidence that they carry over the lessons of experience from one occasion to another. Upon this all are agreed. Whether they have conscious memory such as human beings possess and whether we are justified in assuming this to be true in the light of the evidence presented, is quite another matter and raises a question upon which experts differ. Obviously, for scientists engaged in this field of investigation, it would from many points of view be a material gain, in convenience at least, if the possible existence of consciousness might be forgotten and all animal behavior be described purely objectively. Nor has there been, so far as I am aware, any general objection to this proposal. To be sure, one still requires in describing this behavior, to distinguish between that which is hereditary, instinctive and reflex on the one hand, and that which represents individualistic ‘acquired’ adaptation to environment on the other. Needless to remark, it is primarily with behavior of the latter kind that consciousness has been commonly assumed to play its chief part.

In studying animals it has naturally been easy to fall into modes of describing their activities which presuppose the presence of consciousness in forms resembling that of man under similar conditions. The more penetrating criticism of recent investigators has disclosed the subtle dangers involved in such an assumption and has shown how difficult it is to secure evidence unequivocal in its indications of processes identical with human mental activities. This circumstance has inevitably bred in many comparative psychologists that strong disposition already mentioned to shun the term consciousness on the ground that it is superfluous for an intelligent apprehension of animal behavior and that such terms as 'acquired' and 'instinctive' behavior may serve every purpose in reporting all of which we can really be confident, while avoiding any encroachment upon the dangerous regions of speculation.

It is furthermore not unnatural that finding it practicable and convenient, as undoubtedly it is, to waive reference to consciousness in matters relating to animal behavior, the tendency should manifest itself to pursue a similar line of procedure in dealing with human conduct. This tendency does not so much represent any formally recognized program like that of our world-reforming realists, as it does a general drift occasioned by several different causes and proceeding from several different sources. Its informal and unselfconscious character is probably indicative of a more substantial and enduring basis than belongs to movements more carefully and more purposely nurtured.

The revolt against the domineering claims of introspection as the alpha and omega of psychological method—a revolt which in America found one of its earliest and most pungent expressions in Professor Cattell's address at the St. Louis Congress—constitutes one division of the tendency I have in mind. We have been told by many of our recognized leaders, and with particular clearness by the honored president of our association for 1912, that we can and do secure many of our most important forms of knowledge about the mind, not by introspection but through means as objective as those by which we measure time and space. Obviously, such knowledge must be gained by observation of the physical conduct of the individual or group of individuals whom we study. As such it involves the study of behavior as truly as does the study of animal actions, and it makes no more necessary use of the concept of consciousness.

Here belong such achievements as social and racial psychology can offer. Here, too, may be found much of sociology, economics, and history. The behavior of the mob, the execution of the ceremonies of religion, the various psychic and social circumstances surrounding the development of the family and clan, the peculiarities of sex and race, these are all matters of human behavior which lend themselves in large measure to objective description as well as to objective investigation, and the results so gained may not only claim a validity as great as any ordinary introspective observation, they are often in the very nature of the case results to which introspection in any usual sense of the term affords no adequate approach.

Again our so-called functional psychology, in one at least of its embodiments, has persistently emphasized the entire act from sense organ to muscle as the significant object of attack and has resolutely set its fact against any study of consciousness which divorces it from action and especially such study of it as consists in the search for structuralistic elements as the final *terminus ad quem* of psychological investigation. The exponents of this trend have refused to face the mind-body problem in the conventional dualistic manner, with its inevitable discontinuity of mind and body actions and have treated the distinction involved as one falling functionally inside the life cycle of the individual organism. Such a view obviously renders it easy to welcome a category like behavior which accents in its very first implication the fact of objective action. Allowing for some conservative reservations, its general tendency would be in the direction of sympathetic acceptance of the behavior concept as a general term under which to subsume minor distinctions in modes of action whether conscious or unconscious.

The current doctrines of conscious attitude clearly lend themselves to incorporation in such a movement. The same thing may be said of the psychology of relation—a subject of so much interest in current writing. Even the imageless thought doctrine might conceivably find a home here. Certainly the very terms "attitude" and "relation" suggest modes of behavior, whether one conceives them in purely psychical form or in physiological ways.

It is no part of the purpose of the present paper to scrutinize the attack of the philosophers on consciousness. In due course whatever is empirically usable in the results of this assault will be taken up into the body of our scientific methodology. But the time is certainly ripe to invoice some of the more flagrant defects of 'consciousness' as a working concept of psychology and to this end we may profitably devote a few moments.

It is an interesting fact (if it is *really* a fact, as I believe it to be) that those psychologists who have kept closest to a detailed study of the actual operations of the mind and especially those who have worked most exclusively in the laboratory have been least disturbed by the frailties in the conception of consciousness. When you are experimentally determining the special form of imagery which your memory employs in a given situation, it is a matter of rather remote interest whether or not ambiguities lurk in the notion of consciousness. And the same thing is true when one is trying to ascertain the fidelity and the permanency of a memory process. One may even examine the mental complexion of an act of choice and find oneself quite unperturbed by ulterior considerations concerning the nature of consciousness. And so it is with the rank and file of strictly analytical problems. But the moment one begins to inquire how the mental act of choosing is converted into the neuro-muscular act of speaking one's mind, questions concerning the nature of consciousness come tumbling down like heaven's rain upon the just and the unjust.

Now occasional fortunate psychologists have found their somewhat simple interests entirely satisfied to play with the analysis of mental acts taken merely at their face value as mental, being content either to waive all question of their relation to bodily processes, or to accept parallelism, or perhaps to assume a naif interactionist attitude much after the manner of common sense. But the rank and file have been more sophisticated, and having eaten of the tree of knowledge, they have as usual suffered the pangs of spiritual indigestion. They have not contented themselves with a mere analysis of conscious states as such. They have inquired into both their antecedents and their consequences and in both directions they have harvested trouble and perplexity. Indeed, a few—and these for the most part are ravening philosophical wolves arrayed in the sheeps' clothing of psychologists—are inveterate investigators of the immediate implications of consciousness, self-consciousness, and the like. We may be exonerated of any intentional discourtesy if we observe that it requires no very high order of ingenuity to raise questions on this line whose successful answer implicates entire philosophical systems. In any case, the point to be made here is simply this, that one may carry out the program of a purely analytical psychology until the descent of the eternal twilight in which all cats are gray, without once feeling distressed by the improprieties of consciousness. But to overstep the limits of these confines in any direction and especially to attempt an understanding of the method by which one has come to his facts, and much more the way in which the mental and the physical come in touch with one another,—as obviously they do, both in sensation and volition,—this is to let loose a very Pandora's box of intellectual plagues whose ravages one is powerless to stay.

It is because the conception of consciousness has been at once too specific and too vague that it has led to such endless difficulties. It has been too vague in its failure to distinguish such differences as awareness and feeling, in countenancing and encouraging the antithesis between consciousness and self-consciousness, in permitting the same term to be used to describe on the one hand the cessation of all mental activity, as in the phrase 'he lost consciousness,' meaning he passed into coma, and on the other, the mere obliviousness to a particular impression, as in the expression, 'I was not conscious of his gesture.' It has been too specific in that it has carried with it the notion of some kind of non-material entity, by some authorities alleged to be space-occupying, by others defended vigorously as non-spatial, by yet others regarded as receiving and giving off energy in exchange with physical sources of energy, by not a few regarded as wholly insulated from direct contact with the physical world and yet in some miraculous way reflecting the events in that world. Whether we shall gain or lose in fleeing from these ills to others that we wot not of, remains to be seen.

In considering the claims of behavior as a substitute for consciousness it will be well to safeguard ourselves against certain prepossessions gained from temporary conditions in our intellectual world. To most of us I am sure the term comes with a biological connotation, but we must not forget that chemistry discusses the behavior of the molecules, that astronomy relates the behavior of comets and that consciousness the despised may not only be regarded in its entirety as a mode of organic behavior, but that within its own jurisdiction it reveals innumerable variants each of which may be regarded as a special form of conscious behavior, *e. g.*, simple apprehension, judgment, desire, and aversion. In other words, if we are to accept the somewhat *naif* and uncritical biological use of the term, we must be prepared to expand or contract it as exigency may require.

Let us imagine our psychologist—or our behaviorist, as we may shortly be calling him—starting to define his field.[1]

---

[1] I regret that Professor Watson's brilliant article pleading for the discarding of all subjective method in psychology (Psy. Rev., Vol. XX., p. 158) had not come to hand before this paper was written. I cannot now take up in detail any of its contentions, though I shall hope to do so at some later time. In general I should recognize cordially the service rendered by so courageous and lucid a statement of creed, although a part of the program seems to me rather Utopian and impracticable and other portions appear to disregard somewhat obvious distinctions and difficulties. Meantime, as I indicate in the present paper, I am heartily sympathetic to most of the author's constructive, positive program for emphasizing objective methods in psychology. This I made clear in my paper before the Association at Minneapolis in 1910.

He might adopt some of the familiar old phrases and dub it the description and explanation of behavior. But at once we need qualifiers. What kind of behavior; stellar, geological, chemical? Obviously not. Physiological, zoölogical, mental? Yes and no. It might prove unprofitable to invade very far the realm of physiology, which has to do primarily with those metabolisms and their supporting mechanisms by which the organism maintains itself. Clearly, however, the line of demarcation between this territory and that preempted by general zoölogy in its divisions devoted to the study of animal behavior, is anything but sharp. The mechanisms of the optical reflexes are matters primarily of physiology. But their actual employment, their utility, their origin, etc., are matters belonging to zoölogy. In zoölogy we find recognition at once of innate and acquired forms of behavior. Here then, as we have before noted, would open up our new field. Mental life, conscious process, as our psychologists have dealt with it, has had to do with reactions which were mainly concerned with new individualistic adaptations. The behavior which we should study in man would be in part therefore, the old instinctive behavior, but in part this new personalisticly adaptive behavior. As a program this is entirely intelligible. Indeed, it sounds very much like our current psychological texts—in its purposes anyhow, if not in its terminology.

But now the crucial question arises: Can we carry out this program? Can we give an account of human behavior leaving out all purely subjective or conscious reference and above all—as the most crucial test of some of the newer ambitions—can we dispense wholly with introspection in gaining such objective descriptions?[1] Let us examine some typical situations and see what occurs.

---

[1] Cf. Professor Robert MacDougall's interesting paper in this journal (Vol. XIX., pp. 386–403, especially pp. 396–7 and 400) in which he defends the position that psychology deals with facts that '*cannot* be objectively discerned' although 'their existence may under certain conditions be inferred.' It must be apparent that when the investigation of mental life becomes purely objective, the term 'psychology' will have lost most of its propriety as a designation for such a science. Indeed, the exclusion of the psyche from 'psychological' consideration has proceeded so far that the fitness of the term for its current use may even now be challenged.

Analytical and experimental psychology has made much of the resolution of color experiences into simple qualities. Can such distinctions be stated in terms of overt motor behavior and can they be attained without the aid of introspection? Obviously one may give a qualified affirmation to the first half of the question. The differences in color qualities may be indicated by differences in motor behavior, and when remarked, do commonly secure such recognition. Not only does one give a different name to varying hues, one also reacts in a dozen different ways to a dozen different colors. Certainly it would be possible by a mere study of a man's behavior to ascertain what his capacities are for color discriminations. To determine this with nicety would require patience and experimental skill, but it could certainly be done. Indeed, it *is* done in every psychological laboratory, and with animals as well as with men. But we must not forget that whenever we avail ourselves of language as a mode of approach to objective behavior, we are apt to find ourselves compromising with introspection, for such language may simply report mental states in the ordinary introspective fashion.

In the same way, one may determine by objective methods the limits and peculiarities of perceptual capacity, the tenacity and scope of memory, the range and subtlety of imagination, the degree of available concentration, the power and flexibility of reasoning, the firmness of purpose, the resources of character and so forth and so on. If one inquires how this may be done, the reply is 'through the refinement and elaboration of just those methods by which men have always tested one another, *i. e.*, their practical achievements in the face of practical exigencies.' This man's memory is better than that man's and the fact of his superiority is common knowledge. This man's imagination is more active than his neighbor's, as is witnessed by his readier wit, inventiveness, artistic productivity or what not. This man's courage and resolution surpass his friend's, as is clear from the slightest survey of their respective careers. All these differentiations lend themselves to objective test. To be sure some of these tests are extremely crude. But they might be improved and in any case the point is that the important distinctions in mental capacity and function may be observed without direct resort to introspection; in other words, they may be judged in accordance with objective behavior and accordingly the conscious processes implicated in them may be disregarded as objects of study in favor of this behavior.

A closer observation of certain situations shows that however valid this conclusion may be in a general way, it encounters serious practical difficulties at not a few points. For example, here are two persons memorizing a given material. They do equally well. Hence we may judge what? That they have the same kind of memory? Not at all. Simply that tested by this task they are equally effective. Introspection may reveal the fact that the two persons work by wholly different methods. Then it should follow either that the differences are not significant for behavior and may accordingly be disregarded on pragmatic principles, or else that we must find other tests which will disclose in unequivocal objective form the existence of the differences at issue. In theory this reply is adequate, but in practice, as every one knows who has made experiments upon memory or upon imagery, it is at present rather futile. Thus far no such tests have been devised and there is at present no great prospect of such. The mind is provided with so many and so flexible shunt systems, it translates from one material into another so quickly, that it promises, for a long time to come, to baffle the skill of the experimental 'behaviorist' at many points. It remains for him then to urge the trivial and insignificant character of differences so elusive, and perhaps he is right. But right or wrong, there are at present innumerable instances of which this is one—processes of rational reflection afford others—where objective methods are at present only competent to give rough surface facts.

What then is to be said of the second half of the question, that which relates to the gaining of evidence? Are we within measurable distance of being able to discard introspection, even supposing it were thought desirable to do so? We are all familiar with the hard things which have been said about introspection. We know the old charge that psychology could never be a science because it must forsooth depend upon introspection—a process which is not only susceptible to all the ordinary errors of observation, but which, in the indictment, suffers from the further and fatal defect that in its very nature it results in a destruction or distortion of the mental fact which the observer intended to study. And we know the ingenious attempts to turn the edge of this criticism by exploiting the method as one of retrospection or one of construction. We have faced, too, the more *fin de siècle* and more empirical criticism of the psycho-analytic school with its insistence upon the general unreliability of introspection as evinced in psycho-analytic procedure. Meantime, if one offers up as a burnt sacrifice, the word 'introspection,' everybody, plain folks, psychologists, and psycho-analysts, alike, believe themselves to be in immediate possession somehow or other of reliable information concerning their own feelings, sensations, and intentions. In all this conviction they may of course be deluded. But at least they cherish the conviction and not primarily on any grounds of objective behavior, but rather on the ground of their direct conscious apprehension—call it what you will. Direct access to these facts of feeling is gotten only in this way. Indirectly we may get at them in many ways, as we do in studying history or in watching the actions of others. Our question must then reduce itself to another, *i. e.*, is it scientifically worth while to get at these purely subjective facts? Can we not get all that is of permanent significance and worth by other means? My own pain is a matter of compelling interest to me personally, but to science it is simply one among many pains and of interest only as it can be given context with its generic antecedents and consequences. The one type of interest is ephemeral, the other is relatively permanent.

If we set out resolutely to learn all we can of human behavior without recourse to introspective methods, we find a situation of substantially the following type: we know that stimulations of various physical kinds fall upon the sense organs. We know that some of these issue at once in muscular or glandular activities. We know in some cases the intermediate neural pathways involved. We know something of the changes occasioned by muscular activities in the physical world. We know that some muscular activities of a coördinated and efficient sort arise when no apparently adequate sensorial stimulus is at hand. We know that present behavior displays modifications which can only be attributed to previous behavior. We therefore know that in some way the organism stores up its experiences and creates the possibility of a variability in reactions such as baffles all prediction. But what happens between the time a stimulus affects a peripheral organ and the later time at which some reaction is made, we can often only judge with approximate accuracy provided the individual concerned tells us what has passed in his mind during the interim. The same thing is true of those reactions which are made in seeming independence of any immediate sensorial excitation. In other words, we have not at present any technique for ascertaining the train of neural units intermediate between a specific sensorial stimulation and a specific delayed response. This gap we must bridge with information gleaned from essentially introspective sources or else leave it open. As a matter of fact, however, one could not long remain in ignorance of the *general character* of these intermediate happenings unless one were prepared to forego all conversation with other human beings and to eschew all contact with poetry and fiction, for from all these sources a steady rain of introspective description—good, bad and indifferent, false and true—is constantly falling: to say nothing of the poisonous introspective miasma always rising in one's own mind, however resolutely objective one may be.

All things considered then, we may reasonably question whether we can at present throw over introspection altogether, unless we are prepared to content ourselves with the two end terms of a series of events of which the intercalary links are frequently most complex and significant. These links are now often accessible to us only in mental terms.

The type of criticism indulged by our psycho-analytic friends ought not to be allowed to confuse the issue. To say as they do that a reagent's introspective *explanation* of a specific reaction is generally worthless might be accepted as true for the sake of argument and still leave entirely untouched the fact that his introspection is entirely valid for certain other purposes, such, for example, as declaring whether·or not the stimulus word stirred up a visual image in his mind. Introspection under its most pretentious forms has its limitations like every other method. Those limitations cannot in fairness be generalized into a universal defect. The explanation of a reaction is one thing. For this introspection may or may not afford an accurate basis. To state what occurred in one's inner experience at a given moment is quite another thing and for this purpose trained and controlled introspection is often entirely adequate.

What becomes, on such a program, of psychology as the science of self? What becomes of the entire system of moral and spiritual values and experiences? Two replies seem obviously possible. One is that these values will all be ultimately conserved and recognized, but that in place of descriptions couched in subjective terms, they will now appear described in terms of their objective equivalents. One suspects that the thrills of young love when so portrayed will present a somewhat clinical not to say mortuary appearance. But it always takes time to learn to speak a new language and if such acquirement spares us persistent annoyance, it may be worth while. The other reply is that these interests are to be turned over entirely to ethics, metaphysics and religion, which long ago preëmpted the larger part of them. We shall then be changing names rather than facts. Certainly we must not deceive ourselves into supposing that any such procedure as that we have been considering will lay the ghosts. Persons will still be interested in these problems of mind and morals and will seek their solution, under whatever flag they may march in so doing.

After all is said and done, something corresponding to consciousness in its vague common meaning does exist and it is within its compass that the problems of science arise. We must be cautious therefore that in seeking for bettered means of knowing human nature in its entirety we do not in effect commit the crowning absurdity of seeming to deny any practical significance to that which is its chief distinction—the presence of something corresponding to the term mind—the one thing of which the fool may be as sure as the wise man.

We may agree then that in theory all and in practice much of our mental life might be stated in terms of objective behavior. To do this would involve trespassing rather freely on the preserves of biology, physiology, and neurology on the one side and upon those of the social sciences on the other. But such trespass is perfectly legitimate provided the trespasser is willing to face the chance that he may find himself annexed, appropriated, and in general swallowed up by the owner of the territory which he invades. When she abandons the stronghold of consciousness as her peculiar institution, psychology is moderately certain to find that as an autonomous government she has ceased to exist and has become a mere dependency of biology or some other overlord. But this change of allegiance is not likely to terrify many of her subjects. The point of view from which not a few of our recent psychologists have conducted their work would make such a shift of emphasis entirely easy. (I count myself among this number.) Whether it is worth while is another matter. Personally, I am disposed to think it is, for the reason that every step forward in that direction renders more obvious the actual vital significance of mental process and this happens to be the thing that interests me. I want to see just how ideas and feelings embody themselves in action and a psychology which makes objective description its main concern must inevitably further this interest.

When it comes to discarding introspection I demur.[1]

---

[1] I do not in this paper undertake to embark upon the troubled waters of definition. Suffice it to say that however introspection be defined and whatever merits and defects may be alleged to attach to it as a method for ascertaining facts, all, so far as I know, are agreed that we are directly cognizant of our own experience in a manner different from our indirect apprehension of the experience of others. Whatever this *direct* mode of approach may involve under final analysis, it may serve for the moment to

Introspection ought to be checked by every possible objective device, but even for one frankly and exclusively interested in objective behavior as such, it seems to me at present to afford information not to be gained elsewhere. Indeed, as was intimated above, we are saturated from childhood on with prepossessions, convictions, ideas, of which we cannot wholly divest ourselves if we would, which have introspection as their foundation and which enter in to color our entire conception of behavior.

At this point too we come upon one of those fundamental lines of cleavage in human interests which cannot be justified, but which nevertheless determine conduct and career. The person to whom mental process as mental process is the only fascinating and ultimately worthy subject of study is not likely to rest content with any such program as that depicted. He justly urges that to recognize and describe the *external expressions* of love, hate, and anger is as different from the actual experience of these thrilling emotions and from the description of them as immediately felt, as is the inspection of a good meal from the consumption of the same. To such an one any abandonment of introspection must seem a pitiful and mean desertion of the real object of worth. Whether this view permanently prevails or becomes an esotoric scientific cult, it is a safe prediction that we shall always have it with us.

It is a wise instinct which science has always followed to glean information wherever it can be found. Until it can be shown, as it has not yet been shown, that introspection is either fundamentally incompetent, or clumsily and viciously misleading, it is the part of good judgment to use it. Refine it, check it, train it, but do not throw away a good tool until

represent the sort of thing I have in mind by introspection. Cf. Professor Titchener's interesting articles in the *American Journal of Psychology* (Vol. XXIII., pp. 427, 485) and Professor Dunlap's indictment of current implications of the term in this journal (Vol. XIX., p. 404). I find myself largely sympathetic to the position taken by Professor Dodge in his paper on the 'Theory and Limitations of Introspection' (*Amer. Jour. Psy.*, Vol. XXIII., p. 214). Since this paper was written, Professor Bode's paper on Introspection has come to hand (*Jour. Phil., Psy. and Sci. Methods,* Vol. X., p. 85) in which he presents an interesting revision of the usual implications of the term and the process to which it applies.

you certainly have a better in hand. And do not forget that in much which offers itself as objective method, introspection is really involved either directly or indirectly.

Let us then bid the movement toward objective methods and objective description in psychology God-speed, but let us also counsel it to forego the excesses of youth.

Mormon
Group Life

Ericksen
Other
Dissertations

BRIGHAM YOUNG UNIVERSITY
3 1197 00660 6690

Date Due
All library items are subject to recall at any time.
AUG 0 2 2011

Brigham Young University